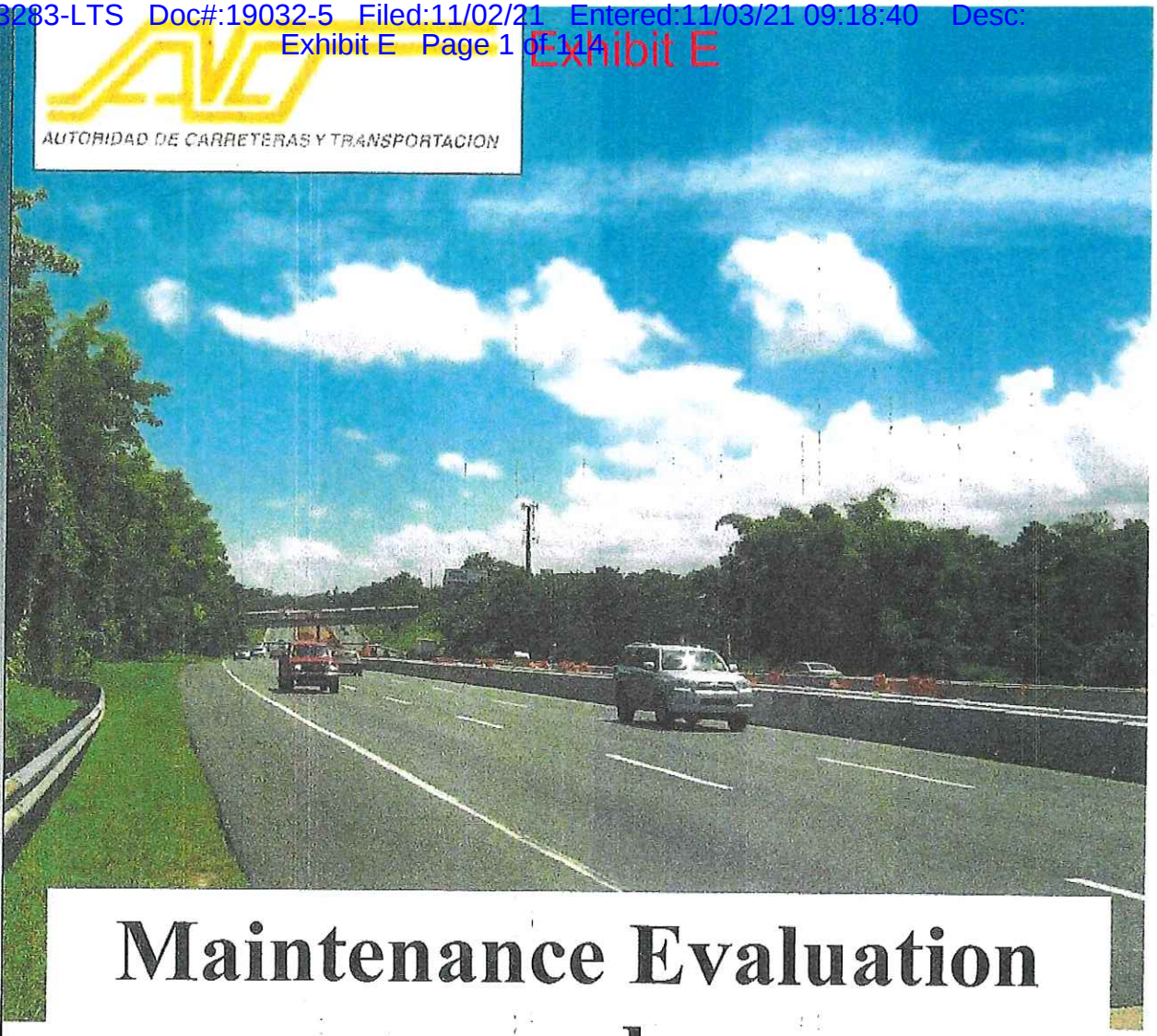
Exhibit E

AUTORIDAD DE CARRETERAS Y TRANSPORTACION



Maintenance Evaluation and Program Review 2014-2015

Draft Report

October 2015

JORGENSEN
Roy Jorgensen Associates, Inc.

TABLE OF CONTENTS

Page

Chapter One – BACKGROUND AND SUMMARY 1-1

Background 1-1
Conclusions and Recommendations 1-2
Maintenance Evaluation 1-2
Plan and Construction Improvement Program Review 1-5

Chapter Two -- MAINTENANCE EVALUATION 2-1

Objective 2-1
Procedures 2-1
Sample Size 2-6
Urban Train Maintenance Evaluation 2-9
Evaluation Findings 2-12
Summary of Condition Ratings for Roadways 2-12
Detailed Discussion of Roadway Characteristics 2-15
Summary of Condition Ratings for Tren Urbano 2-30
Maintenance Budget Review 2-34
Conclusions and Recommendations 2-39

Chapter Three – MASTER PLAN AND CIP PROGRAM REVIEW 3-1

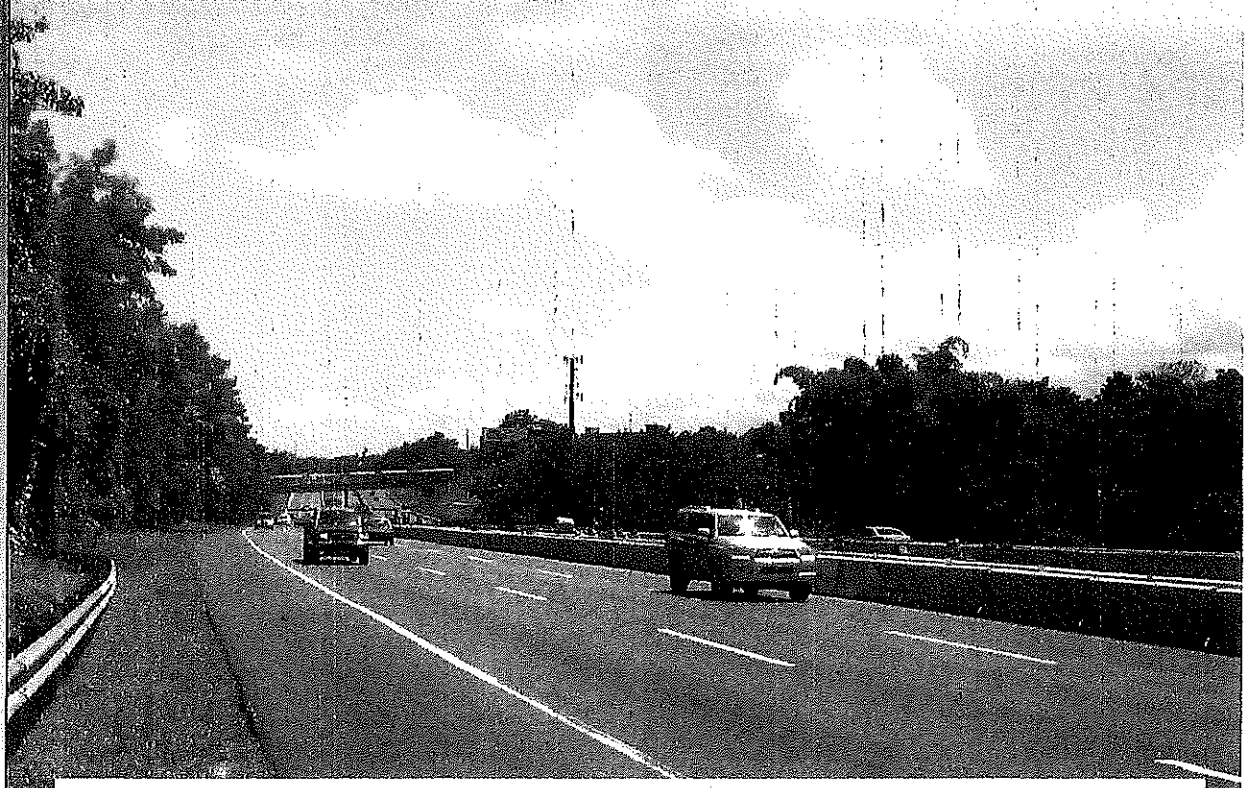
Objective 3-1
Procedures 3-1
Island Wide Long Term Transportation Plan Review 3-2
Construction Program Review 3-4
Funding Projections 3-6
Recommendations 3-14

Appendix - CONDITION RATINGS BY REGION AND ROAD CLASS

Region 1 San Juan A-1
Region 2 Arecibo A-6
Region 3 Aguadilla A-10
Region 4 Mayuquez A-14
Region 5 Ponce A-18
Region 6 Guayama A-23
Region 7 Humacao A-28
Summary by Functional Class A-33
Summary of All Roads A-37

Note: Areas within this draft report highlighted in yellow still require revision to update information.

AUTORIDAD DE CARRETERAS Y TRANSPORTACION



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Chapter One

BACKGROUND AND SUMMARY

This section of the annual Maintenance Evaluation and Program Review for FY 2014-2015 (FY 2015) Report summarizes the requirements behind this effort and provides a summary of the conclusions and recommendations that are found in Chapters Two and Three. Appendix A contains a tabulation of the condition data that was collected during the field inspection during spring of 2015.

BACKGROUND

This report is prepared in response to the requirements of Sections 606 and 607 of Resolution 68-18, entitled "Resolution Authorizing the Issuance Of Puerto Rico Highway Authority Revenue Bonds", adopted June 13, 1968 by PRHTA, and Sections 605, 606 and 607 of Resolution 98-06, entitled "Puerto Rico Highway and Transportation Authority Authorizing the Issuance of Transportation Revenue Bonds", adopted on February 26, 1998.

Prior to the creation of the Puerto Rico Highway and Transportation Authority (PRHTA), the construction of roads and bridges was the responsibility of the Department of Public Works and was dependent on annual appropriations from the Legislature. The Authority was created by the Puerto Rico Highway Authority Act (Act No. 74, June 23, 1965, and amended by Act No. 112, June 21, 1968) that included a provision for the issuance of bonds for the construction of Traffic Facilities. These traffic facilities now include the completed portion of the Tren Urbano (Urban Train) that services parts of San Juan.

The conditions under which bonds could be issued were further clarified by the above-referenced Resolution 68-18. The resolution included a requirement that Traffic Engineers be engaged to conduct an annual general evaluation of the level of maintenance of Traffic Facilities constructed with the appropriate funds. Traffic Facilities are defined as those facilities financed in whole or in part by the issuance of bonds under the provisions of the Resolution. Due to the merging of funds in the Authority's accounting process, all roads and bridges constructed or reconstructed since June 1968 are regarded as Traffic Facilities.

Resolution 68-18 also includes a requirement that, after completing the maintenance evaluation, the Traffic Engineers are to comment on any supplements made by the Authority in the Master Plan or in the Five-Year Construction Improvement Program (CIP).

On February 26, 1998, the PRHTA approved Resolution 98-06, which included a change in the definition and name of "Traffic Facilities" to "Transportation Facilities".

Under the new definition, the Tren Urbano and transit facilities supporting the Tren Urbano are also included. The construction of this initial phase was completed in 2004. Testing and revisions were then carried out through early 2005. Operation began on June 6, 2005. Additional phase have been planned but have not been constructed due to the lack of funding as well as a general overall concern of the economic viability of the program. The first phase of the Tren Urbano has now been in operation for 10 years without any major maintenance problems. During this years' on-site inspection, several days were spent inspecting three stations that had been inspected during the last evaluation and three additional stations that were not part of the last inspection. This is the 10 year of inspections of the Tren Urbano and review of the operations and maintenance program.

This report presents the results of the annual general evaluation of the level of maintenance of that portion of the highway system in the Commonwealth of Puerto Rico known as "Traffic Facilities" for the Fiscal Year 2015. Also, the report includes a review of the current Puerto Rico Island-Wide Long Range Transportation Plan 2040 draft (prepared in May 2013) and the current Five-Year Construction Improvement Program (for Fiscal Years 2015 to 2020) of the Puerto Rico Highway and Transportation Authority (PRHTA).

CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations that follow are summarized from both the traffic facilities maintenance general evaluation and from the Plan and Construction Improvement Program review.

Maintenance Evaluation

Based on the results of analysis of the data from the field evaluation for FY 2013 and the review of the maintenance expenditures the present level of maintenance being performed on the four administrative levels of the road network and the Tren Urbano is generally adequate to preserve the investment in these facilities for the anticipated life of these facilities. The review has revealed that some characteristics on specific road classes in general and within specific Regions specifically still require renewed focus to bring them up to the overall average level of service expected from an organization such as PRHTA which operates at the equivalent level of a state highway department. Over time it is recognized that conditions will vary from region to region due to environmental effects and local traffic loading. Based on the current condition of each road class, increases and decreases in the condition ratings are within acceptable limits for fluctuations in maintenance of the various types of facilities. This means that there were no drastic changes, either for the better or worse of the sample sections that reflect the current condition of the roadways.

It should be noted that revenues to fund highway rehabilitation, repair and maintenance have been decreasing for the past eight years due to the overall economic condition in Puerto Rico. This situation began in Puerto Rico in December 2006 and

continues to effect the overall economy, particularly transportation funding. The federal government has provided some relief in the immediate past through the American Relief and Recovery Act (2009); however this has not been enough to replace declining revenues that are the major source of highway construction and maintenance funding. This program is now complete with no new supplemental program to replace it. While the Commonwealth received a large payment (over a billion dollars) in late 2011 for the payment of the PR-22/PR-5 concession these funds were channeled toward repayment of bond debt and other financial obligations and not for roadway maintenance and repairs. Also, it should be noted that with the implementation of this concession, the revenues previously realized from these tolled roadways will not be available for use in either the Autopistas or the DTOP maintenance program. (Discuss FAST program)

While the overall level of maintenance is determined to be adequate to preserve the existing facilities for the near term (through the next five years), there are several situations where maintenance of specific roadway assets remains a concern. The following recommendations are made relative to the findings and conclusions derived from the general maintenance evaluation performed between January and April 2015. Some recommendations are similar or the same as those presented in previous years because only slight improvements have been observed relative to the previous conditions from earlier years. Therefore, the following recommendations are the result of the main findings of deficiencies throughout the roadway system.

- As the **infrastructure continues to age**, more maintenance on the supporting components of the road and bridge systems needs to be carried out. These include such items as shoulders, bridge abutments and drainage. This is compounded by the increase in **traffic volume,** especially the number and weight of commercial trucks. The Authority must find ways to increase maintenance funding levels or come up with more **effective alternative maintenance strategies** in order to mitigate the problems caused by the aging process. It is suggested that some portion of the sales tax and other new taxes t being discussed could be used for maintenance and rehabilitation purposes. Alternative strategies could include organizational realignment to focus on the worst-case first, or contracting out maintenance on a unit price basis, or setting aside areas or designated lengths of specific functional classes of roads to be maintained through the asset management strategy.

- For the Tren Urbano, the O & M Contractor needs to continue the efforts put forth during the first eight years in being diligent in maintaining the infrastructure of the stations and other areas such as bus transfer platforms and parking areas. For example, if a pathway is made by pedestrian traffic, it may be more appropriate to design and install a walkway rather than try to restrict traffic from this area by putting up a fence, which will eventually have to be repaired. While these activities were not anticipated, they still exist and must be attended to in order to keep the facility in top condition. Since the facility is still not getting the ridership that was originally anticipated, the wear and tear

is not a great as it could be. Keeping the facilities clean, well-lighted with good security and in general good repair for the Tren Urbano customers is an important factor in retaining and increasing ridership. Small maintenance activities like litter pick-up and washing windows and walls help present the facility in a better light and attract new riders.

- Focused programs for **repairing pavement markings** should be developed and implemented for the Tertiary roads in areas where there where there are high accident and incident levels. Accident statistics and traffic studies would identify the specific locations. Initial focus should be on rural mountainous areas and sub-urban areas where PR routes run through built-up areas. Also, striping on bridge decks is a continuing problem, not only in Puerto Rico, but throughout the US. The Traffic Operations Department needs to research this issue and find a product that will be effective in adhering to concrete bridge decks so that delineation of traffic is not a problem.

- Repairs to areas where there have been **landslides** need to be planned and implemented to get the roadway back to full operating capacity as soon as possible. There continues to be damage caused by landslides on both cuts and fills. While several of these have been repaired, other location remain barricaded or detoured causing traffic as well as safety problems. Contracts for these repairs need to be expedited to complete the outstanding jobs before a new storm causes more damage.

- A program to inspect and closely monitor **bridge decks** still needs to be implemented either at the Region level or the overall Authority level. It is noted that there is funding in the current CIP for such a program. The concern is focused particularly on **stress cracking and pop-outs**. The deck failures experienced on several high priority bridges in recent years can be expected on other bridges where high traffic loading due to over-weight trucks exists. While several bridge decks have been replaced, additional effort is needed to keep up with this problem. This would involve more effective short term temporary repairs as well as permanent rehabilitation or reconstruction.

- **Bridge deck joint cleaning and seal repairs** on all road classes throughout all regions continue to be a concern. Neoprene seals are seen completely out of the joint and ripped away by the traffic. In other areas the seals are completely missing. While here is no concern for damage due to a freeze/thaw cycle, the lack of a good seal allows dirt and rocks to settle in the joint, making the edges susceptible to spalling which in turn allows for additional debris to collect in the increasing larger pothole. A special, one-time program of repair or replacement of joint seals needs to be developed and implemented on a Regional basis. More frequent cleaning of the joints will also help to preserve the seals.

- While **vegetation control** on the Toll Road system remains at a high level, this year's inspection showed that some areas were falling behind from their normal excellent maintenance of mowed areas and other vegetation. Vegetation control on the other classes of roads continues to be irregular, particularly on the Tertiary Roads around guardrails. In some cases, local residents have taken responsibility for cutting brush along the road. In other cases, nothing has been done for several years on long stretches of road in the rural mountainous areas. While cutting vegetation too short can kill the plants and lead to erosion, doing nothing can lead to overgrown guardrails, signs and ditches causing safety hazards. A more standard approach needs to be formulated and implemented across all regions.

Plan and Construction Improvement Program Review

Based on the review of the Island-Wide Long Term Transportation Plan and the current Construction Improvement Program (CIP) it is recommended that the Authority continue to program pavement improvement activities along the lines developed for the ARRA program in order to improve the condition of specific assets of the transportation facilities under the Authority's care. Also, the continuance of the bridge rehabilitation program may need to be expanded and possibly accelerated. As the AARA program is now completed, the Authority needs to find another dedicated source of funding to continue these efforts.

- With the availability of the ARRA funding, the Authority has taken a good first step **initiating a pavement repair and rehabilitation program.** During this year's field inspections it was noted that a number of locations had been repaired with the use of ARRA funding. It is not clear whether a comprehensive pavement assessment has been carried out by the Authority. If not, an internal review should be carried out by the regional dTOP administration to prioritize the locations to be improved. Based on the condition assessment on a regional basis, available funds should be allocated to take care of the most pressing needs immediately. It may be appropriate to expand the pavement repair program to a pavement replacement program in some areas. The remaining projects will stay on the priority list and used to support requests for additional funding through the annual general budget process. Also, additional funds may be available from the federal government based on the need to make safety improvements in some locations.

- During the past two years the Consultant has noted that some **bridge decks** have been repaired. Redecking projects were part of the ARRA program. This is a good start for eliminating these problems that exist is a number of different locations around the island. A review of the current CIP notes that there are two basic strategies involving bridge repair. There are a number of individual bridge repair/replacement project included in the current CIP. Also, there is a project to conduct a comprehensive bridge assessment and program funds for repair/replacement according to this assessment beginning in FY

2015. Based on the Consultants evaluation sample, there are 8-10 sections of bridge deck on the Toll Roads that require reconstruction and numerous locations on the non-tolls that require either redecking or overlay. It would appear that the main cause of the deck problems on the non-toll roads is due to the original construction practice of not placing the reinforcing steel within the deck at the correct height (either too high or too low) or reducing the thickness of the deck and therefore not up to design specification.

- The poor condition of **bridge deck joints and deck drainage** continues to be a pervasive problem. The overall ratings for these two characteristics are the lowest of all characteristics. Deck Joints scored a 37.6 Good rating this year, which was up slightly from the previous year. However, the overall Good rating should be above 70 in order to indicate adequate maintenance of this characteristic. Deck drains rating of 58.1 Good is also better than previous years however, as with the Deck Joints efforts should be initiated to improve this rating to above 70. This could easily be done by developing a local community program that would take care of this maintenance activity. Since these local communities paint the bridges, they should be encouraged to periodically clean them also.

- The CIP includes several projects for repair of **bridge abutments and scouring** around piers. There are additional locations that need repair or rehabilitation. A review of the current NBIS condition listing identifies specific bridges that are in need of this work. This should be a high priority program in order to ensure structural integrity of each bridge and minimize the risk of having to close the bridge due to unsafe traffic loading.

- **The effort to identify and program improvements to striping, especially in rural areas on the Secondary and Tertiary systems needs to continue until all ratings for this characteristic are above the 70% Good level.** Currently the Tertiary Road network has an overall Good rating of 67.7%, which is up from the previous inspection. However, this is still below the overall level of a Good rating of 70%. Lane striping and edge marking, particularly in rural and hilly areas, is especially hard to see at night and during rains due to faded and missing lines. Also, as stated earlier, lane striping on concrete bridge decks is a particular technical problem that must be solved so that striping does not disappear from these areas. The current CIP contains projects for safety improvements that include striping. Also other projects identified include what are called traffic improvements which include striping as well as signal improvements and signing.

- **New emphasis should be placed on sign repair and replacement programs, particularly for Primary and Secondary Roads.** The overall Good condition rating for this asset has dropped below 90% and currently stands at 88.3% Good. Graffiti has become a problem on signs within the Toll Roads. Missing or damaged stop signs and route markings are the biggest

problem on the other roadway classes. These are safety problems that may qualify for additional federal funding or grant programs.

- A new program identified in the CIP involves the upgrading of guardrail and other roadside barriers to the required NCHRP 350 standards. This program will not only meet the new required safety standards, but also provide rehabilitation for many kilometers of currently damaged or missing guardrail. Federal funding is a part of this program.

- With the **decline in traditional revenues** (resolution revenues and tolls) that help fund construction and maintenance programs, the Authority needs to find new or additional sources of revenue to meet the maintenance needs of the currently aging system as well as new facilities that are being completed. The current concession of two toll roads has resulted in the Commonwealth receiving a large amount of cash that is not being applied toward roadway activities. In addition, the revenue stream form these toll facilities is now lost for 40 years. As a minimum, the amount of estimated funds from the revenue of these two toll facilities needs to be set aside for future funding of maintenance and repair to the remaining toll roads as well as additional set asides for other classes of roads. Alternately, other methods to reduce the cost of operation and maintenance should also be pursued. This could include increasing of specific taxes; outsourcing of the maintenance function in specific areas or on specific classes of roads.

Chapter Two

MAINTENANCE EVALUATION

This chapter provides background information on the approach and procedures used to carry out the annual maintenance evaluation of Puerto Rico's transportation facilities and a summary of the results of the FY 2015 (July 2014 - June 2015) condition ratings for roads and bridges as well as the Urban Train (Tren Urbano).

OBJECTIVE

The annual maintenance evaluation required by Resolution 68-18 is directed toward surface and shoulder condition, as well as condition of all structures and signing of Traffic Facilities. Resolution 98-06 added a requirement for the general evaluation of the level of maintenance, repair and operating condition of Transportation Facilities, which includes all traffic facilities, certain transit facilities, and any other highway, road, transportation facilities or undertakings permitted by the enabling act. The principal facility that has been added by the 1998 Resolution 98-06 is the Tren Urbano (Urban Train), with the first phase becoming operational in August 2005. The overall objective of the annual maintenance evaluation project is to determine whether all of these facilities are being maintained in good repair, working order and sound condition; and to make general recommendations regarding maintenance activities, repairs, renewals and/or replacements of the various assets that make up the roadways.

This general maintenance evaluation is concerned primarily with the adequacy of the level of maintenance of Transportation Facilities, mainly roads and bridges, but now also includes the Tren Urbano. Any unsound or unsafe conditions of these facilities resulting from causes other than maintenance practices, such as overloading, natural disasters (storms, landslides, etc.), design, and the normal aging process, may not be detected by this general evaluation as it is intended to be only a visual assessment of the assets. If the results of the visual assessment indicate that there may be other underlying deficiencies at a particular location or with any asset group, they are included in the report findings and conclusions.

In order to carry out this annual evaluation, a program has been devised to provide accuracy and consistency in the annual inspections and ratings. This involves of collecting condition data on specific assets at specific sample locations throughout the four levels of road networks and Tren Urbano system. Sampling locations have been identified using the Authority's road and bridge inventory that is periodically updated for additions to the inventory. For the Urban Train, a sample of six stations and the track between those six stations is inspected. A data collection form was designed to document the condition of each feature within each sample location as observed by a team of two trained highway engineers who specialize in maintenance. The specific locations of the majority of roadway samples remain the same from year to year so as to be able to make comparisons over time between specific facility types and at standard locations. As new sections of roadway are constructed, additional samples are added. These locations on the road network are known only to the consultants. Three samples of the Tren Urbano stations

are changed from year-to-year and three remain the same. Three different stations are selected at random so as to cover all stations within a six year period. All six stations are identified in the report.

PROCEDURES

The Traffic Facilities were inspected by a team of experienced highway engineers over a period of several weeks beginning in March 2015 and completed in May 2015. The condition rating procedures were field-validated by trial runs prior to the actual inspection trips to ensure accurate and consistent ratings by the inspection team. To maintain consistency in the ratings from year to year, the previous year's ratings were reviewed in the field prior to making a rating for the current year. The inspection of the Tren Urbano facilities was conducted separately after coordination with the PRHTA and with the Tren Urbano operator ACI.

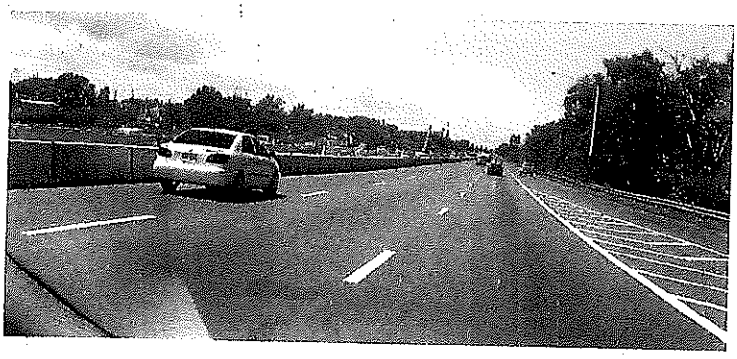
Road Maintenance Evaluation Form

The evaluation of Road Traffic Facilities was carried out by the team using the Road Maintenance Evaluation Form shown in Figure 2-1 on page 2 – 5. This form is designed to document maintenance condition information on 23 features divided into three basic roadway elements.

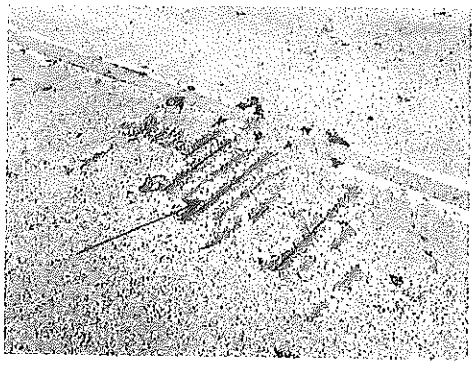
- roadway features;
- structures features (bridges or overpasses with a total span length > 20 feet); and
- traffic control devices.

The individual maintenance feature type for each element is shown on the sample form in Figure 2-1. During the field inspection, each feature is rated by both engineers as Good, Fair or Poor based on a percentage value of observed conditions within the sample point. The basic criteria for the three condition levels are as follows:

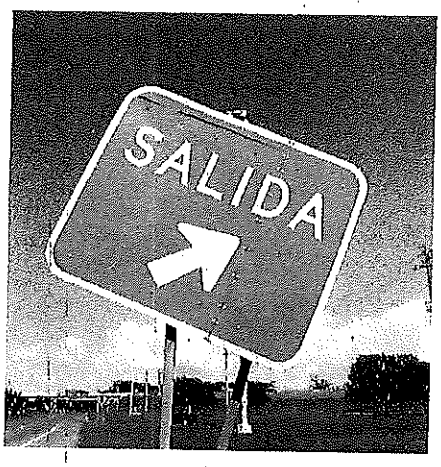
- **Good**: Current minimum condition is satisfactory with only continued normal maintenance required. Under normal circumstances, major repair work should not be required within the next three-five years. Below are two photographs showing an example of a good sign and a good pavement.



- **Fair:** Current condition of the feature is acceptable. However, some additional maintenance attention is needed to restore the feature to Good condition. In some places, "spot improvements" may be needed to restore the feature to a Good condition. The photos below show examples of "Fair" sign and pavement and conditions. In these cases the sign should be replaced because it has lost its reflectivity and has stains and stickers on its face. The repair for the exposed rebar on the pavement should be a thin overlay until such time as the deck can be completely resurfaced.



- **Poor:** Current condition is unsatisfactory and maintenance effort must be substantially increased. For some features, major repairs or rehabilitation will be needed to restore the feature to Good condition, or where a significant percentage of the feature is rated as Poor, reconstruction should be considered. Below are two photographs showing a sign and a pavement section in poor condition.



The sign has been hit by a vehicle and the base is damaged as well as the upper left hand portion of the sign. Although the face of the sign is in fair condition, the upper portion is bent and damaged. The repair to this asset should be total replacement including the posts as it could be a liability in any future accident. The failure of the roadway in the picture on the right was caused by a subsurface failure about five years ago. This area has been repaired and is now been restored to good condition.

Most of the road segments that are evaluated are several kilometers in length and conditions often vary along an individual segment. For linear roadway features, such as pavement, shoulders, ditches, pavement markings and guardrail, condition ratings were calculated as a percentage of the feature's overall length. For point locations other than bridges, such as culverts, traffic signs and signals, the ratings were calculated as a percentage of total number of occurrences within the sample section. Summaries of roadway feature ratings by region and road class use weighted averages based on segment length. For example, if there were 10 signs in a particular sample section and four of them had graffiti or were broken, the rating would be a maximum of 60% Good. The actual condition of each damaged sign would then determine if it should be Fair or Poor rating.

Since there is rarely more than one major structure on any one road segment, the structure condition ratings usually apply to only one structure on a segment. However, if more than one structure was rated on a particular road segment, each structure was rated separately. Structures are counted as individual items and the overall condition of the structures characteristics are based on the assignment of the condition of the individual assets of the bridge and then assigned to the good, fair and poor categories. Summaries of structure ratings by region and road class are averages of the individual structure ratings.

The background information for each sample section is located at the top of the Section Evaluation Form. It includes location data, such as road number and length of segment; physical profile information such as road functional class and surface type; and inspection validation such as date of inspection and names of the inspectors.

The administrative system for defining road classes is the system that was used prior to 1999 in order to maintain consistency with previous years. The road classes, which are used in several data tables later in this chapter, are defined below:

Road Class	Class Name
1	Primary
2	Secondary
3	Tertiary
4	Expressway (Toll Roads)

For administrative and overall operational management purposes the Authority divided the Island into districts many years ago. In 2001, these districts were further realigned from five to seven and given the title of region.

As stated above, these regions were recently consolidated by ACT into five main administrative regions. These are Metro, Oeste, Norte, Sur and Este. The STIP divides the Island into four areas based on population density. They are not contiguous. These areas are not the same as those presented in the Puerto Rico Long Term Transportation Program which are also divided into areas based on population density on a larger scale and are contiguous.

Due to the limited time in preparing the FY 2015 Evaluation Report, the consultant was not able to discuss all of the different divisions of the administrative and planning areas with Commonwealth authorities and come to an agreement on organization of the administration areas

in order to present a new arrangement. Therefore, the divisions used for comparison of maintenance conditions over time are the same as those used in previous years (the seven Regions).

It is hoped that there will be sufficient time prior to the next evaluation periods (FY2016) to sort out the organization structure of the current administrative regions and realign the data collection and condition analysis to be compatible to whatever organization is currently in place in PRTHA. The current plan is to Schedule meetings with appropriate PRHTA managers (such as Asset Management and Maintenance Divisions) for this fall 2016. As a result the new alignment of the Municipalities will be reflected in future evaluation reports. This will require initiation of new data sheets for each sample section beginning with the year prior to the current evaluation year as well as reconfiguration of the data base that holds all historical data and will then enable the continued year-to-year comparison between administrative regions

The geographical subdivisions used in this report are based on the PRHTA regions that were in effect since 2001 and are referenced by number as shown below: It is acknowledged that these regions have changed during the last three years, however, to be able to do an effective comparison among the sample data and therefore extrapolate to the region as a whole, the consultant has opted to keep locations within the seven known regions which are as follows:

Number	Region Name	Municipalities Included
1	San Juan	Bayamón, Carolina, Cataño, Trujillo Alto, Guaynabo, Río Piedras, San Juan
2	Arecibo	Arecibo, Barceloneta, Ciales, Corozal, Dorado, Florida, Manati, Morovis, Naranjito, Toa Alta, Toa Baja, Utuado, Vega Alta, Vega Baja
3	Aguadilla	Aguada, Aguadilla, Camuy, Hatillo, Isabela, Lares, Moca, Quebradillas, Rincón, San Sebastian
4	Mayaqüez	Añasco, Cabo Rojo, Guánica, Hormigueros, Lajas, Las Marias, Maricao, Mayaqüez, Sabana Grande, San German, Yauco
5	Ponce	Adjuntas, Coamo, Guayanilla, Juana Díaz, Jayuya, Orocovis, Peñuelas, Ponce, Santa Isabel, Villalba
6	Guayama	Aguas Buenas, Aibonito, Arroyo, Barranquitas, Cayey, Cidra, Comerío, Guayama, Patillas, Salinas
7	Humacao	Caguas, Canóvanas, Ceiba, Culebra, Fajardo, Luquillo, Guarbo Humacao, Juncos, Las Piedras, Loiza, Yabucoa, Maunabo, Naguabo, Río Grande, San Lorenzo, Vieques.

The condition rating of each feature is segregated by road functional class within each Region. In this way condition ratings for each feature can be presented by functional class, Region, or the whole Commonwealth.

Figure 2-1

ROAD MAINTENANCE EVALUATION FORM

PUERTO RICO TRAFFIC ENGINEERING STUDY REPORT

INSPECTION DATE: _____ INSPECTORS: _____

ROAD NUMBER: _____ REGION: _____ PROJECT YEAR: FY _____

PROJECT DESCRIPTION: _____

STATION: FROM _____ KM - TO _____ KM LENGTH: _____ KM

ADMIN. ☐ Primary TERRAIN ☐ Mountainous SURFACE ☐ Low Bit. SHOULDER ☐ Paved / Curb
SYSTEM: ☐ Secondary TYPE: ☐ Rolling TYPE: ☐ High Bit. TYPE: ☐ Gravel / Earth
☐ Tertiary ☐ Level ☐ Concrete ☐ Other
☐ Toll

NO. OF LANES: _____ LOCATION NOTES: _____

	MAINTENANCE FEATURES	CONDITION RATINGS - % OF SECTION			
		GOOD	FAIR	POOR	COMMENTS
ROADWAY	1 Pavement Surface				
	2 Pavement Structure				
	3 Shoulders / Curbs				
	4 Ditches / Drains				
	5 Slopes				
	6 Vegetation Control				
	7 Culverts				
STRUCTURES	8 Approaches				
	9 Deck				
	10 Deck Joints				
	11 Sub-Structure				
	12 Piers				
	13 Abutments				
	14 Drainage				
	15 Parapets / Rails				
	16 Super-Structure				
	17 Painting				
	18 Waterway				
TRAFFIC	19 Signs / Reflectors				
	20 Guardrails / Barriers				
	21 Pavement Markings				
	22 Signals				
	23 Overhead Signs				

Sample Size

In view of the time and resource constraints for this evaluation, all traffic facilities could not be individually inspected. However, by inspecting a statistically valid representative sample of all facilities, reliable conclusions can be drawn about the adequacy of the general level of maintenance on both old and new facilities. Figure 2-2, on the next page, provides a summary of total number of kilometers of roads within each of the four classifications that were constructed or rehabilitated through December 2014 broken down by region and road class. It should be noted that this value is less than that listed in the FHWA road tables that use a different classification system. A summary of the kilometers of road sections inspection by the Consultant's field crew is shown in the fourth column. Work that consisted of general improvement of one asset type, such as guardrail, or spot improvements at intersections were not added to the total length. Although the toll road administration is not aligned with the public works regions, toll roads are categorized by public works region to be consistent with the other road classes.

The table below summarizes the total kilometers of roads in the program since 1968 versus the number of kilometers in the sample by road functional class and total. Note that the number of kilometers of Toll/Expressway roads is first presented in centerline kilometers and then in directional kilometers (excluding ramps). This is because Toll Roads are evaluated in each direction.

Road Class	Total 1/ (Km)	Total Population (Km)	Sample Size (Km)	Sample (Percent)
Toll 2/	193	387	387	100
Primary	768	768	389	36
Secondary	761	761	295	35
Tertiary	1,152	1,152	243	34
Total	2,173	2,365	1,315	55

1/ Length includes area of reconstruction and rehabilitation of some existing traffic facilities. Does not include PR-22 and PR-5 that are now operated and maintained by Metropistas.
2/ Only centerline kilometers are shown here. Sample total is in each direction.

When conducting inventories and inspections using sampling, it is important to determine the minimum sample size that would yield valid results in the given situation. Using standard statistical sampling methodology for this type of program, a sample size of between 5 and 10 percent is common, based on the confidence level to be achieved. As can be seen from the computation of the percent sample from the values in the table, the sample size used for this evaluation is more than adequate to meet statistical standards for making a determination of the overall condition of each class of roadway. Many years ago it was decided to provide the

Authority with a 100 percent sample of the Toll roads because of their high priority and limited length. In 2013 the sections of PR-22 and PR-5 that are now under the responsibility of Metropistas were removed from the sample, therefore reducing the overall length of the toll roads and the amount of the toll roads samples by a total of 174 km. It should also be noted that the total length of all traffic facilities may be somewhat smaller than the values shown above and, therefore, the actual sample percentages may actually be higher than the values shown. This is due to the possibility that more than one improvement may have been made to an existing facility since 1968, therefore some road sections under rehabilitation and reconstruction may have been counted more than once in the totals. Since the data has now accumulated over a 40 year period, there are a number of locations that have had multiple repairs and/or rehabilitations on the same alignment. Toll roads PR-22 and PR-5 will not be included in the overall inventory value or the condition sample. If additional toll facilities are concessioned in the future they will also be removed as the Authority will no longer be maintaining them. A separate program within the Concession Agreement directs the concessionaire to yearly undertake a condition assessment of all assets within the concession limits and report the findings to the PRHTA.

Figure 2-2
Summary of Traffic Facilities Constructed or Reconstructed 2/
Traffic Facilities Inspected (June 2015)

District	Road Class	Number of Projects	Length	Number of Samples	Length of All Samples
1 San Juan	1	145	179.40	18	57.90
	2	74	76.95	22	50.40
	3	75	60.30	5	14.80
	4	53	58.92	17	48.10
	Sum	347	375.57	62	171.20
2 Arecibo	1	50	137.73	10	73.60
	2	82	152.21	17	65.20
	3	29	302.59	15	33.60
	4	54	64.50	0	0.00
	Sum	215	657.03	42	172.40
3 Aguadilla	1	30	71.05	8	50.80
	2	39	115.35	12	54.90
	3	77	139.23	19	51.50
	4	6	4.10	0	0.00
	Sum	152	329.73	39	157.20
4 Mayaquez	1	37	78.74	9	54.70
	2	47	89.62	6	36.60
	3	89	140.46	7	28.50
	4	0	0.00	0	0.00
	Sum	173	308.82	22	119.80
5 Ponce	1	64	84.05	18	47.30
	2	47	114.65	7	20.60
	3	95	133.21	13	33.00
	4	38	57.08	8	74.20
	Sum	244	388.99	46	175.10
6 Guayama	1	43	79.75	6	12.70
	2	39	81.30	4	11.30
	3	94	128.76	16	42.90
	4	39	63.20	12	148.00
	Sum	215	353.01	38	214.90
7 Humacao	1	76	137.15	21	86.30
	2	59	130.76	10	35.90
	3	139	247.53	21	59.20
	4	46	86.40	10	117.40
	Sum	320	601.84	62	298.80
All	1	445	767.87	90	383.3
	2	387	760.84	78	274.9
	3	598	1152.08	96	263.5
	4	236	334.2	47	387.7
	Sum	1666	3014.99	311	1309.40

2/ Length (km) may include more than one reconstruction and/or rehabilitation project for some existing facilities.
Road Classes: 1 = Primary, 2 = Secondary, 3 = Tertiary, 4 = Toll/Expressways

Urban Train Maintenance Evaluation

The Commonwealth and the City of San Juan began the development of a light-rail facility throughout the San Juan metro area in 1996. The system was to serve the major residential and business areas of San Juan and eventually reach as far away as Caguas some 50 km to the southeast. The initial phase of development included 17.2 kilometers of mainline track connecting 16 stations. See Figure 2-3 on the next page for a graphic summary of the existing facilities. Construction of this initial phase was completed in 2004. Between 2004 and 2005 testing, inspection and repair of the system was carried out before public operation began on June 6, 2005.

The initial network connects Bayamon to the west with Sagrado Corazon in the northeast and passes through the northern edge of the downtown business area. Ten stations are elevated; three stations are at-grade; and three stations are below grade or underground. A typical station includes a semi-enclosed structure with two sets of tracks running through it; bus bays for transfer of passengers from bus to rail; parking lot(s); and driveways leading from nearby roadways into the parking areas as well as passing by the main entrance to the station. Not all stations have parking facilities, which are free.

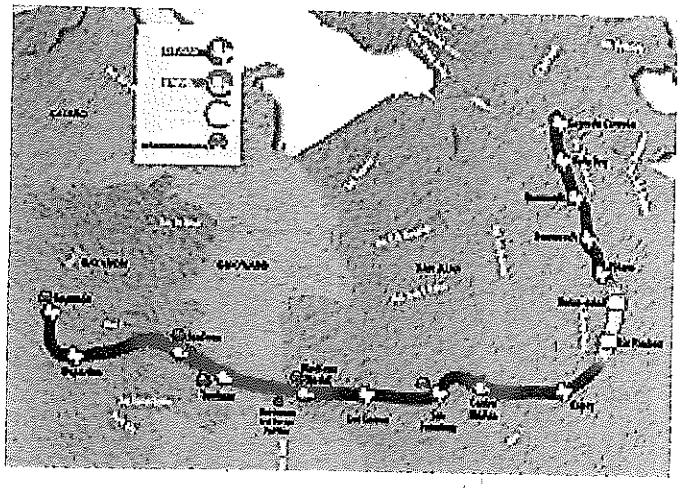
There are currently 74 rail cars in the inventory. The initial system also includes a large compound close to the Martinez Nadal Station that houses the train operations center; the maintenance yard and shed; and management and administrative offices of Alternativa de Transporte Integrado (ATI) personnel and the operations contractor Siemens/Alternative Concepts, Inc. (ACI). Operation on a fare paying basis began in June 2005. The current period of operation is from 5:30 am to 11:30 pm however, the system is kept in operation later for special events. Since the beginning of operation on-time performance has steadily improved an average with the current average is about 99 percent according to ACI. Ridership on the system has never achieved the level originally forecast prior to construction of the system. The first year of operation, the average weekly ridership was calculated to be approximately 28,000. In 2010, the average weekly ridership was estimated at 40,100. Even with the cut in fares by 50% the ridership has not greatly increased to the levels originally estimated. It is estimated that current ridership is approximately 36,000, which is approximately 35 percent of capacity.

Between 2004 and the end of 2005 ATI and the project management consultant addressed a number of construction and operational concerns that had become apparent through rigorous reviews and inspections of the various facility components. The initial contract with ACI was for a 5-year period and has been renegotiated for another 5 years at a somewhat reduced operating budget. The operations and maintenance contract is now in place until 2015. How this will affect operations and maintenance remains to be seen. In order to protect the project and the Federal Transit Authority's interest in the system, the firm of Booz-Allen-Hamilton was hired in 2006 to conduct a quality assurance review on the overall system and operations. This review provided additional direction and recommendations mainly for the operation and finance of the system and has now been implemented for the most part.

Two new programs will affect the operation of the Tren Urbano. The new BRT from Toa Baja to Bayamon began operation in August 2014 and should bring additional ridership to the system. Also, the P3 Authority is promoting the implementation of a light rail program that extends

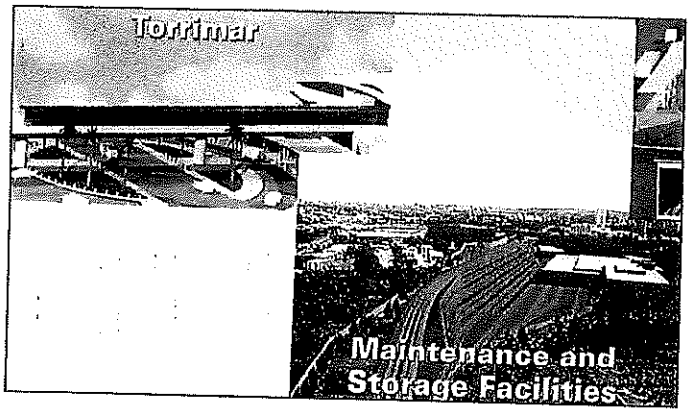
service from San Juan to Caguas along the PR-52 corridor. This would connect with the Tren Urbano and also provide additional ridership from those people who currently commute to San Juan by car.

Figure 2-3
Tren Urbano – Typical Station



Current 17.2 km Tren Urbano route from Bayamon in the west to Sagrado Corazon to the north east.

Drawing of Torrimar station and maintenance facility at Martinez Nadal



Typical passenger waiting platform at a station. Most platforms are covered but open to the environment.

During the past 14 years Jorgensen personnel have met with ATI and ACI personnel to review their maintenance program and determine the level of maintenance being carried out. While the maintenance and repair of the rolling stock and the track are performed or closely supervised by the Operations Contractor, most of the facilities and grounds maintenance work such as HVAC repair, cleaning, and landscaping is performed by local subcontractors selected and supervised by ACI.

ACI uses a very detailed method of reporting and documenting operations and maintenance activities. These processes are documented in a Quality Assurance /Quality Control Program and Policy and Procedures Manual, ATI – Tren Urbano, June 2005 (revised annually). There is also an inspection schedule showing what assets are inspected on which frequencies. As the private operations contractor, ACI has a vested interest in maintaining the system in good repair because the contract allows the owner to assess penalties for non-performance in both the operations and maintenance functions. The process works as follows:

- ACI has performance criteria to meet, based on published specifications in the above referenced manual;
- ACI has its own QC inspection program and reports results to ATI; and
- ATI has a QA program to check on ACI.

As a result, there is a highly structured organization that has many programs in place to protect the investment that Puerto Rico has made in the Tren Urbano. So far this seems to be working well.

Jorgensen's inspection of this traffic facility takes a general approach along the lines of the method currently used to evaluate the condition of the roads and bridges. During the annual visit to the Island, time is scheduled to meet with the Operations Contractor and discuss current issues and problems relative to the maintenance function. Field inspections are then made to six selected stations as well as a general review of the entire length of the track and right-of-way. This level of inspection provides for a review of the general overall condition of the system and is detailed enough to be able to highlight any obvious maintenance deficiencies being overlooked by the operator.

For maintenance evaluation purposes the Tren Urbano facility is broken down into the following six elements:

- Parking and Driveways
- Building Interior
- Cars
- Building Exterior
- Train Platform
- Throughway

Each element has a number of features, such as pavement, walls, lights, fencing, and signs that can be inspected to determine if they are being maintained in a safe, operational, and preserved condition. The rating scheme for these features follows the same format as that of the roads; using the assignment of a percentage of Good, Fair, and Poor to each feature.

EVALUATION FINDINGS

The findings for the FY 2015 maintenance evaluation are provided below. The facilities inspected consisted of roadways, bridges, traffic operations, and the Tren Urbano.

Summary of Condition Ratings for Roadways

The major increases and decreases in the Good ratings for the 23 roadway characteristics have been tabulated by functional class of road and by Region. A major change in the rating is defined as any increase or decrease in the characteristic score of more than 2 percentage points from the previous evaluation score. Figure 2-4 summarizes these major changes (increases or declines) that have occurred to characteristics within the four functional classes between January 2013 and May 2015. Figure 2-5 summarizes the major increases and decreases to each characteristic based on the seven Administrative Regions.

Figure 2-4
Major Changes to Roadway Characteristics
By Functional Class

Characteristic	Functional Class				
	Primary	Secondary	Tertiary	Tolls	Overall
Roadway					
Pavement Surface					
Pavement Structure				-2.70%	
Shoulders/Curbs					
Ditches/Drains		1.90%			
Slopes					
Vegetation Control		-1.80%			
Culverts					
Bridges					
Approaches					
Deck	2.70%				
Deck Joints		11.30%	4.70%	-8.10%	2.70%
Sub-structure					
Piers					
Abutments					
Drainage	6.20%	9.60%		-7.00%	
Parapets/Rails					
Super-structure					
Painting					
Waterway					
Traffic Operations					
Signs/Reflectors					
Guardrails/Barries			-2.10%	-4.00%	-2.40%
Pavement Markings				-3.60%	
Signals					
Overhead Signs	11.20%				2.40%

Overall condition ratings continue to improve on the Primary roads with the Toll roads declining over the past two years. While the Toll roads still have the higher overall ratings, they have declined the most (based on percentage) during this period. The typical process of Autopistas spending more money per kilometer on maintenance than does dTOP on the other three classes of roadways has not provided the general expected results during this period. Since ACT has reduced its inventory by approximately 87 kilometers (PR-22 and PR-5) and received a large payment for this asset, it would be expected that the resources typically used on these two roadways would be put to use on the remainder of ACTs toll roads. Unfortunately, this has not been the case. One explanation is that during the same timeframe as the transition of PR-22 and PR-5 to Metropistas, government organizations were going through a downsizing program and therefore lost number of personnel who might have been assigned to do maintenance work on the Toll roads.

Good condition ratings averaged over all roads were only better in four categories. There were also five categories where there was substantially no change in the overall rating of the asset. The 13 remaining categories all declined in their ratings. The two largest declines were both in the Toll roads. The two largest improvements were for Overhead Signs in the Primary Roads (11.20 %) and Deck Joints in the Secondary Roads (11.30 %). While Primary roads showed consistent improvement in each category, Toll roads showed declines in most categories. Secondary and Tertiary roads had both improvements and declines.

Within each of the four functional classes there continues to be changes to the condition of a number of characteristics due to the annual emphasis placed on each road class within each region. The most significant changes to characteristics within each functional class are summarized below.

- Primary Roads had major improvements in Bridge Decks (+2.70%), bridge deck drainage (+6.20%) and overhead signs (+11.20%). There were no characteristics with the significant declines. There continues to be small decline in 11 other characteristics with increases in 3 others. This is a modest overall improvement from the previous evaluation period
- Secondary Roads showed major improvements in two characteristics; bridge deck joints (+11.3%) and drainage (+9.60%). There were no major declines. Eight characteristics saw minor declines while five other characteristics showed minor improvements. Bridge deck drainage continues to make improvement reducing the Poor category and increasing both the Good and Fair categories.
- Tertiary Roads showed major improvements in only one characteristic; bridge deck joints (+4.70%) There were two major declines: bridge deck drainage (-3.40%) and guardrails/barriers (-2.10%). There were 11 characteristics that showed minor improvement while there were five that had minor decline. In general, Tertiary Roads showed overall improvement, especially in deck joints, which has been a problem for many years.
- Toll Roads did not have major improvement in any category. There were five major declines: pavement surface (-2.70%); bridge deck joints (-8.10%); bridge deck drainage (-7.00%); guardrails/barriers (-4.00%); and pavement markings (-3.60%0. While there was no change in seven characteristics there were minor declines in 10 characteristics.

The same comparison between 2015 and 2013 was made for all characteristics by Administrative Region and the results summarized in Figure 2-5 on the next page. The following summary is for all road classes within each region. More specific details on where specific problems were found within each Region are provided in the next subsection where each characteristic is discussed.

Figure 2-5
Major Changes to Roadway Characteristics
By Region

Characteristic	Regions (Districts) San Juan 1	Arecibo 2	Aguadilla 3	Mayaquez 4	Ponce 5	Guayama 6	Humacao 7
Roadway							
Pavement Surface					-3.90%		
Pavement Structure							
Shoulders/Curbs		-2.30%					
Ditches/Drains			2.70%	4.10%			
Slopes							
Vegetation Control		-3.90%					
Culverts							-2.40%
Bridges							
Approaches							
Deck	3.40%				2.50%		
Deck Joints			14.40%	13.40%	2.30%	-3.30%	-8.50%
Sub-structure						-8.40%	
Piers							
Abutments							
Drainage		4.50%		12.80%	8.10%		-11.50%
Parapets/Rails							
Super-structure					4.10%		
Painting							
Waterway							
Traffic Operations							
Signs/Reflectors				2.40%	-2.30%		
Guardrails/Barries	-3.70%				-2.80%	-5.50%	-2.40%
Pavement Markings	-3.00%			2.30%	-2.20%	-4.50%	
Signals					7.90%	2.50%	
Overhead Signs			39.30%				

- Region 1, San Juan had one major increase; bridge decks (+3.40%). There were major declines in two categories; guardrails/barriers (-3.70%); and pavement markings (-3.00%). Although there were only two major declines several other areas have low ratings. These are Primary deck joints (16.67%) and deck drainage (55.00%); Secondary deck joints (54.00%); Tertiary deck joints (57.50%) and deck drainage (50.00%); and Toll roads deck joints (43.75%).
- Region 2, Arecibo had major change in one characteristic; deck drainage (+4.50%). There were two characteristics with major decline: shoulders/curbs (-2.30%) and vegetation control (-3.90%). Areas with low ratings in Region 2 were Primary deck drainage (30.00%); Tertiary deck joints (47.50%); deck drainage (45.00%); and pavement markings (52.61%).

- Region 3, Aguadilla had three major increases and no major declines. Improvements were in the areas of ditches/drains (+2.70%); bridge deck joints (+14.40%); and overhead signs (+39.30%). While the increase in deck joints and overhead signs may seem large there were limited samples which would affect the percentage values. There were five bridges that were sampled and four overhead signs. Low ratings in Region 3 were in the following areas: Primary bridge deck joints (one bridge which was inspection all joints failed); Secondary bridge deck drainage (55.00%); Tertiary bridge deck joints (33.33%) and bridge deck drainage (36.67%).
- Region 4, Mayaguez had major increases to five characteristics and no declines. Increase occurred to ditches/drains (+4.10%); bridge deck joints (+13.40%) and bridge deck drains (+12.80%); signs/reflectors (+2.40%) and pavement markings (+2.30%).
- Region 5, Ponce showed major improvements to five characteristic with declines to four characteristics. Improvements were to: bridge decks (+2.50%); bridge deck joints (+2.30%); bridge deck drainage (+8.10%): superstructure (4.10%); and signals (+7.90)%. The four characteristics that declined were pavement (-3.90%); signs (-2.30%); guardrail (-2.80%); and pavement markings (-2.20%).
- Region 6, Guayama had one major improvement and four declines. The improvement was in signals (+2.50%). The declines were: bridge deck joints (-3.30%); substructure (-8.40%); guardrails/barriers (-5.50%); and pavement markings (4.50%).
- Region 7, Humacao, There were no major improvements and major declines to four characteristics. The major declines were: vegetation control (-2.40%); bridge deck joints (-8.50%); bridge deck drainage (-11.50%); and guardrail/barriers (-2.40%). The lowest ratings were for: Primary bridge deck drainage (56.50%); Secondary bridge deck joints (35.50%); Tertiary bridge deck joints (57.14%) and bridge deck drainage (59.29%); and Toll roads bridge deck joints (46.92%).

Based on the summarization of changes in conditions from 2013 to 2015 it appears that the main areas of concern continue to be characteristics relating the bridge decks such as joints and drainage. To some extent, bridge deck drainage is influenced by seasonal variations in precipitation, so it is difficult to tell if the improvement or decline in deck drainage is caused by heavy seasonal rains or if someone is actually cleaning out these drains. During this inspection period, there had been very little rain in the spring. As a result, some items such as paper products probably did not have a change to wash into the drainage systems, but were blown away instead. Vegetation control is decreasing, mainly on non-toll roads. Road surface condition, especially on sections of the Toll roads appears to be deteriorating at a more rapid pace. If these areas are not repaired in the near term, they will deteriorate to the point where traffic flow will be greatly reduced.

Looking at the individual characteristics by Functional Class, overall there were more declines than improvements, however most of these were only minor declines. Within the range of major shifts from 2013 to 2015 there were nine improvements and eight declines. Of particular note would be the overall improvement to the bridge deck joints (+2.70%) and overhead signs (+2.40%). During two week field inspection period, the team actually observed maintenance

crews doing work on bridge decks, pavement repair, guardrail repair, vegetation control and signal repair.

DETAILED DISCUSSION OF ROADWAY AND BRIDGE CHARACTERISTICS

Condition ratings for the 23 characteristics have been tabulated from the field inspection data and are summarized in Figures 2-6 to 2-10 for all roads combined and each of the four functional classes consisting of Primary, Secondary, Tertiary, and Tolls/Expressways.. Individual characteristic ratings by road functional class within each of the seven Public Works Regions (Districts) are included as Appendix A. It should be noted that, although Toll Road Maintenance Sections are separate entities from the Public Works Regions, the Toll Road ratings are included in the Public Works Regions' summaries for convenience of presentation with the other road classes. Activities observed during this year's inspection included herbicide application, guardrail repair, bridge deck repair and general maintenance, mowing and line striping.

Within the overall roadway network largest changes to the 23 characteristics were the following: Deck Joints (+2.70%), Overhead Signs (+2.40%), Guardrails/barriers (-2.40%). While not a major decline, it should be pointed out that there was an overall decline of pavement (-0.90%). A summary of the major improvements and declines by Functional Class and Region are as follows:

Functional Class

Improvements	Declines
Primary	
Bridge Deck +2.70%	Guardrails/Barriers -2.00%
Bridge Deck Drainage +6.20%	
Overhead Signs +11.70%	
Secondary	
Bridge Deck Joints +11.30%	Vegetation Control -1.80%
Tertiary	
Bridge Deck Joints +4.70%	Bridge Deck Drains -3.40%
	Guardrails/Barriers -2.10%
Expressway (Tolls)	
None	Pavement -2.70%
	Bridge Deck Joints -8.10%
	Bridge Deck Drains -7.00%
	Guardrails/Barriers – 4.00%
	Pavement Marking – 3.60%

Region

Improvements	Declines
1. San Juan Bridge Decks +3.40%	Guardrails/Barriers – 3.70%
2. Arecibo Bridge Deck Drains +4.50% Signs/Reflectors +2.90% Pavement Markings +4.30%	Vegetation Control – 3.90%
3. Aguadilla Ditches/Drains + 2.7% Bridge Deck Joints +14.40% Overhead Signs + 29.30%	None
4. Mayaguez Ditch/Drains + 4.10% Bridge Deck Joints +13.40% Bridge Deck Drains +12.8% Signs/Reflectors +2.40% Pavement Marking +2.30%	
5. Ponce Deck +2.50% Bridge Deck Joints +2.30% Bridge Deck Drains +8.10% Superstructure +4.10% Signals + 7.90%	Pavement – 3.90% Signs/Reflectors – 2.30% Guardrails/Barriers – 2.80%
6. Guayama None	Bridge Deck Joint -3.30% Bridge Deck Drains – 8.40% Guardrails/Barriers – 5.50% Pavement Markings - -4.50% Signals – 2.60%.
7. Humacao Vegetation Control +2.40%	Bridge Deck Joints – 8.50% Bridge Deck Drains – 11.50% Signals – 2.60%

For each characteristic the following summarizes this years' rating compared to the previous year. In addition, five-year comparisons are included for three characteristics within areas of roadway, bridge, and traffic operations. Trend lines for these characteristic ratings are shown by individual graphs for All Roads, Road Class and Region with a discussion of trends for each characteristic.

Figure 2-6
Summary of Maintenance Condition Ratings
All Roads – FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	1315.04	86.73	9.41	3.86
Pavement Structure	1315.04	91.46	7.01	1.55
Shoulders / Curbs	1315.04	89.65	7.32	3.03
Ditches / Drains	1315.04	84.86	9.65	5.49
Slopes	1046.54	95.62	2.43	1.96
Vegetation Control	1315.04	89.25	7.77	2.98
Culverts	1296.54	95.90	2.64	1.46
Bridges	Each			
Approaches	122.00	93.29	5.04	1.67
Deck	122.00	88.89	7.75	3.36
Deck Joints	116.00	49.78	17.46	32.76
Sub-Structures	122.00	99.30	0.16	0.53
Piers	105.00	97.86	1.76	0.38
Abutments	122.00	94.26	3.18	2.56
Drainage	122.00	57.60	16.07	26.32
Parapets / Rails	122.00	97.31	1.20	1.49
Super Structure	52.00	98.08	1.92	0.00
Painting	8.00	87.50	12.50	0.00
Water Way	109.00	98.39	1.19	0.50
Traffic Operations	km			
Signs / Reflectors	1315.04	88.60	7.77	3.65
Guardrails / Barriers	1303.94	86.22	7.67	6.07
Pavement Markings	1315.04	81.41	10.00	8.57
Signals	500.64	99.50	0.16	0.34
Overhead Signs	501.40	99.98	0.02	0.00

Figure 2-7
Summary of Maintenance Condition Ratings
Primary Roads – FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	389.50	86.30	9.24	4.46
Pavement Structure	389.50	91.61	7.03	1.36
Shoulders / Curbs	389.50	90.57	6.64	2.79
Ditches / Drains	389.50	85.27	10.53	4.20
Slopes	266.60	95.63	2.72	1.65
Vegetation Control	389.50	90.27	7.74	1.99
Culverts	371.00	95.12	3.33	1.55
Bridges	Each			
Approaches	31.00	93.55	5.16	1.29
Deck	31.00	82.10	11.61	6.29
Deck Joints	29.00	40.17	27.07	32.76
Sub-Structures	31.00	97.74	0.32	1.94
Piers	29.00	96.90	3.10	0.00
Abutments	30.00	94.17	4.50	1.33
Drainage	31.00	50.16	20.32	29.52
Parapets / Rails	30.00	93.67	2.00	4.33
Super Structure	13.00	97.69	2.31	0.00
Painting	2.00	100.00	0.00	0.00
Water Way	27.00	99.44	0.56	0.00
Traffic Operations	km			
Signs / Reflectors	389.50	87.36	8.39	4.31
Guardrails / Barriers	387.80	86.42	7.53	5.80
Pavement Markings	387.80	83.25	9.86	6.81
Signals	264.10	99.52	0.10	0.38
Overhead Signs	104.50	99.92	0.08	0.00

Figure 2-8
Summary of Maintenance Condition Ratings
Secondary Roads – FY2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	295.14	86.91	9.60	3.49
Pavement Structure	295.14	90.85	7.13	2.02
Shoulders / Curbs	294.14	89.25	7.50	3.25
Ditches / Drains	295.14	79.48	13.12	7.41
Slopes	233.94	94.35	2.69	2.96
Vegetation Control	295.14	85.72	9.22	5.05
Culverts	295.14	94.31	3.10	2.59
Bridges	Each			
Approaches	27.00	94.63	4.81	0.56
Deck	27.00	92.04	6.11	1.85
Deck Joints	25.00	54.40	16.00	29.60
Sub-Structures	27.00	99.81	0.00	0.19
Piers	24.00	98.13	0.63	1.25
Abutments	27.00	91.11	1.67	7.22
Drainage	26.00	58.08	12.50	29.42
Parapets / Rails	27.00	97.78	0.74	1.48
Super Structure	11.00	100.00	0.00	0.00
Painting	2.00	100.00	0.00	0.00
Water Way	25.00	97.60	1.60	1.20
Traffic Operations	km			
Signs / Reflectors	295.14	87.18	8.61	4.21
Guardrails / Barriers	291.04	86.17	6.63	7.20
Pavement Markings	295.14	81.65	10.39	7.96
Signals	170.14	99.58	0.30	0.12
Overhead Signs	15.30	100.00	0.00	0.00

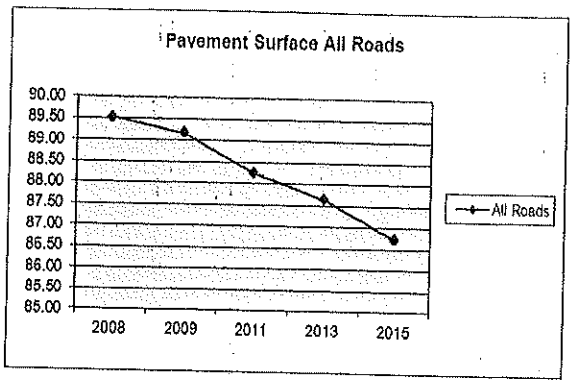
Figure 2-9
Summary of Maintenance Condition Ratings
Tertiary Roads – FY 2015

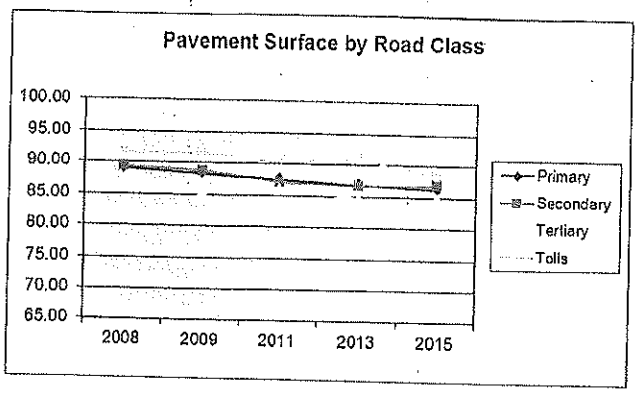
RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	243.00	84.78	10.53	4.71
Pavement Structure	243.00	89.84	7.59	2.62
Shoulders / Curbs	243.00	83.50	10.91	5.58
Ditches / Drains	243.00	72.00	15.43	12.56
Slopes	195.00	94.13	2.46	3.41
Vegetation Control	243.00	81.05	12.63	6.32
Culverts	243.00	93.55	4.23	2.22
Bridges	Each			
Approaches	34.00	93.53	4.41	2.06
Deck	33.00	90.91	7.27	1.82
Deck Joints	31.00	46.77	17.90	35.32
Sub-Structures	33.00	100.00	0.00	0.00
Piers	25.00	96.40	3.20	0.40
Abutments	33.00	93.79	4.39	1.82
Drainage	33.00	48.64	18.64	32.73
Parapets / Rails	33.00	98.33	1.36	0.30
Super Structure	19.00	96.32	3.68	0.00
Painting	3.00	66.67	33.33	0.00
Water Way	32.00	96.88	2.34	0.78
Traffic Operations	km			
Signs / Reflectors	243.00	87.04	8.05	4.91
Guardrails / Barriers	237.70	85.96	7.83	6.36
Pavement Markings	243.00	68.21	13.66	18.14
Signals	49.90	99.00	0.00	1.00

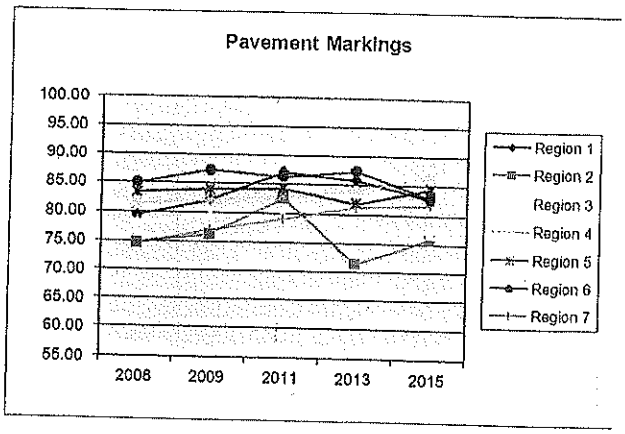
Figure 2-10
Summary of Maintenance Condition Ratings
Expressways (Toll Roads) FY – 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	387.40	88.26	8.74	3.00
Pavement Structure	387.40	92.77	6.53	0.71
Shoulders / Curbs	387.40	92.89	5.60	1.50
Ditches / Drains	387.40	96.60	2.51	0.89
Slopes	351.00	97.28	2.01	0.71
Vegetation Control	387.40	96.04	3.66	0.30
Culverts	387.40	99.33	0.63	0.04
Bridges	Each			
Approaches	31.00	91.61	5.81	2.58
Deck	31.00	90.81	5.81	3.39
Deck Joints	31.00	58.06	9.19	32.74
Sub-Structures	31.00	99.68	0.32	0.00
Piers	27.00	100.00	0.00	0.00
Abutments	31.00	97.58	1.94	0.48
Drainage	31.00	74.19	12.10	13.71
Parapets / Rails	31.00	99.35	0.65	0.00
Super Structure	9.00	100.00	0.00	0.00
Painting	1.00	100.00	0.00	0.00
Water Way	25.00	100.00	0.00	0.00
Traffic Operations	km			
Signs / Reflectors	387.40	91.90	6.33	1.77
Guardrails / Barriers	387.40	86.21	8.50	5.30
Pavement Markings	387.40	87.65	7.55	4.80
Signals	16.50	100.00	0.00	0.00
Overhead Signs	381.60	100.00	0.00	0.00

Overall ***pavement conditions*** showed a continuing slight decline over the past two years; however at least 85 % of the pavement surface and pavement structure can still be classified as Good condition. The graphs below show ratings for this characteristic over the past eight years although ratings were only done biannually between 2011 and 2015. Since 2008 the pavement surface has lost three percent of its Good rating. Over the past 10 years the deterioration rate has averaged .5 percent per year.



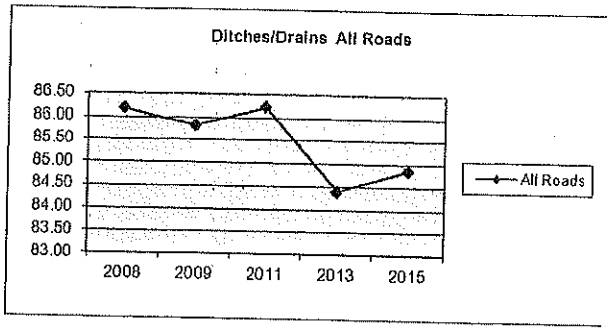


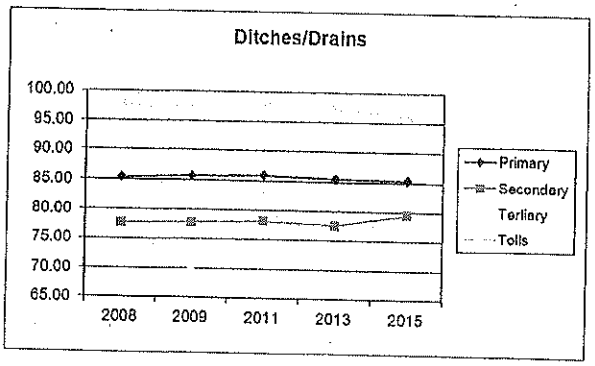


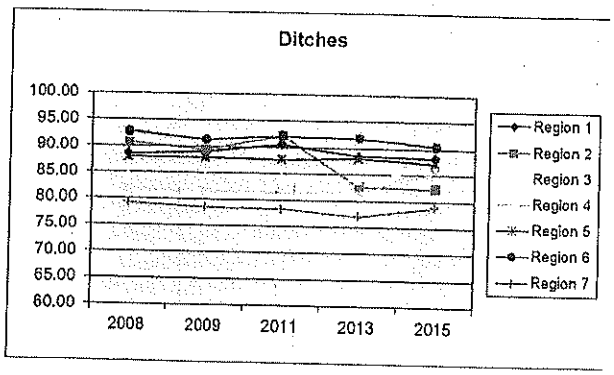
Pavement condition ratings ranged from a low of 84.78 % on the Tertiary road system to a high of 88.26 % for the Toll Roads. While the Primary, Secondary and Tertiary Systems have stayed somewhat constant during the past five years, the Toll System ratings have slipped from 95.85 in 2004 to a low of 88.26 for 2015. The condition for Toll Road pavement decreased by 1.8 percent over the past two years. Pavement conditions were up slightly in Region 2 from 2013. The largest decrease over last year were Toll Roads in Regions 1 and 6.

Pavement structure is rated separately from pavement surface because there may be base and sub-base conditions that cause the pavement surface to fail. In these cases, only stop gap repairs can be made to the surface until more extensive work can be done to fix the underlying problem. The overall Good rating for the pavement structure decreased by 0.3% for since 2013. During this review period, all roads in Arecibo Region decreased by 1.7% which all roads in the other six regions either had a minor decrease or minor improvement. The overall Good rating for Pavement Structure was 91.46 %.

Shoulders/curbs showed a modest decline of 0.7% from 2013 ranging from a low aggregate value of 83.50 % Good for Tertiary Roads to a high of 92.89 % Good for all Toll Roads. The largest declines for shoulders/curbs occurred on Tertiary roads with the largest decline in Region 2 Arecibo



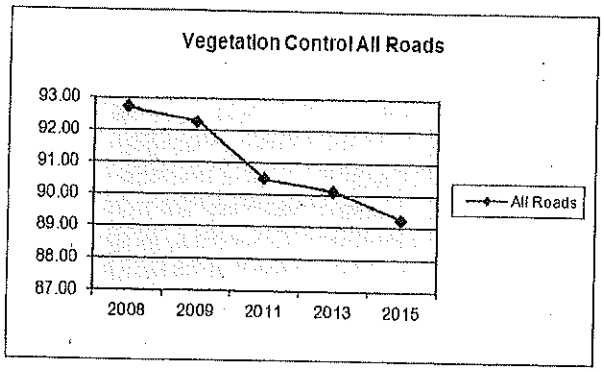


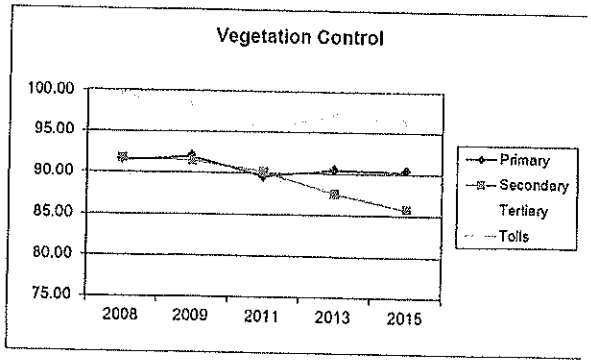


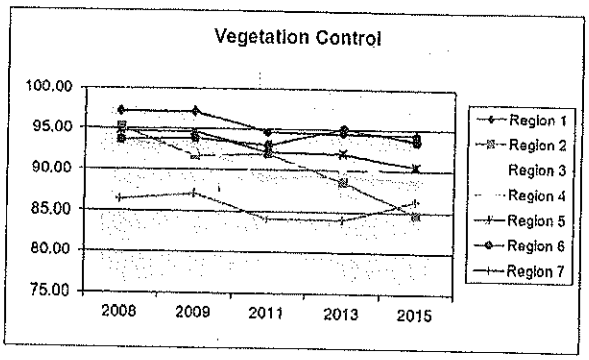
Ditch Condition After a decline ditch condition during the previous reporting period, there is a modest improvement over the past two years. The Secondary roads showed an improvement of 2 percentage points while the Toll roads showed a decline of a little over 1 percent. Primary and Tertiary roads showed a slight improvement. Regions 3,4 and 7 showed improvements in the condition of ditches while Regions 1,2,5 and 6 showed slight declines. Regions 3 and 4 had significant improvements of 2.7 and 4.1 % respectively.

Maintenance of ***slopes*** must be carried out to ensure that embankments are protected from erosion and collapse and that debris on slopes above the roadway is removed or stabilized to protect from landslides that might cause damage to vehicles or block the road. While most of the damage from the past tropical storms is been repaired, there are smaller areas mainly along Tertiary Roads that have not been addressed, primarily in the central and southeastern mountainous parts of the island. Ratings for slopes of all roads have modestly declined from 2013 by 1.7 percent. There were no regions with significant improvements or declines.

Roadside vegetation ratings can vary significantly at the local level from year to year depending on environmental conditions and mowing/weeding cycles. This years' overall roadside vegetation control rating is about the same as last year. This shows good effort to focus on vegetation control throughout the road network.





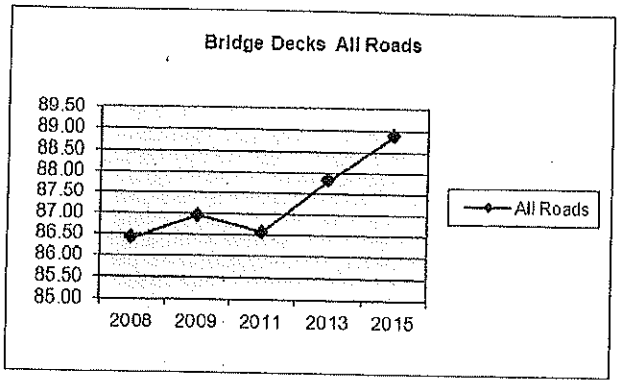


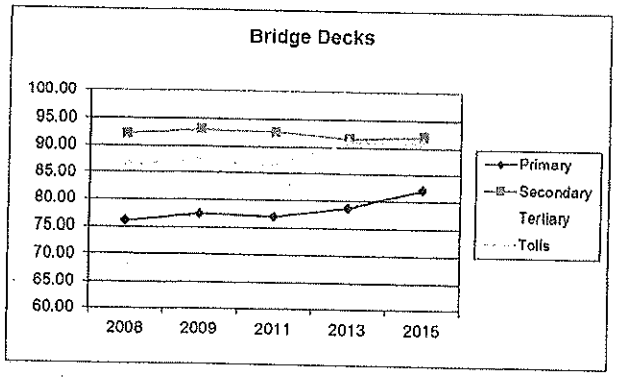
Vegetation control continues to decline since large advances were made up through the early and mid-2000s. Vegetation control on the Toll Roads continues to be the highest rating in this characteristic with Tertiary Roads continuing to be the lowest. Toll roads decreased by one percentage point. All classes of roads showed modest declines. Among the seven regions, only Region 7 showed an increase in Good condition of 2.7 %.

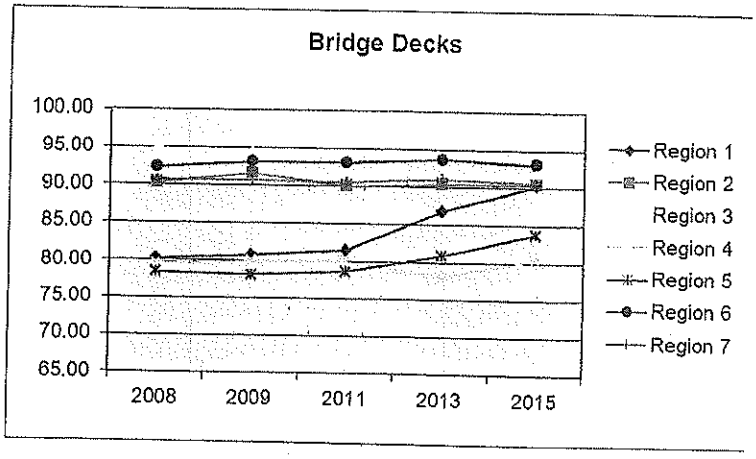
Overall ***culvert maintenance*** declined slightly for the 2015 period compared to 2013. The overall rating for all roads was 95.90, down less than one percent from 2013 with Tertiary Roads continuing to be being the lowest at 93.55. Regions 3 and 7 showed the most decline with 3.9 and 2.4 % respectively. Changes in other regions were between $\pm$ 2 %. These declines are less than the previous years.

Bridge approaches are typically well maintained and ratings for each functional class remain above 90% Good. The overall "Good" rating for 2015 is 93.29% which is unchanged from the previous 2013 assessment. Toll Roads have the lowest overall rating with 91.63%. This is up slightly from the previous 2013 rating. Regions with the lowest scores were Region 1 Tertiary 83.75 % Good, Toll Roads 81.25 % Good; Region 4 T Primary 82.50 % Good; and Region 5 Toll Roads with 82.33% Good. All other regions had scores above 90%.

The overall rating for ***bridge decks*** improved by 1.06% from 2013. This is the second period that has shown improvement with the condition gaining 3 % over the past three years. Prior the 2008 bridge decks where deteriorating. Since 2008 the Authority has made significant improvements by patching and/or replacing the ones in the worst condition. Only Tertiary Roads have declined slightly over the last period. Regions 1 and 5 showed the largest overall increase with 3.4 % and 2.5 % respectively.

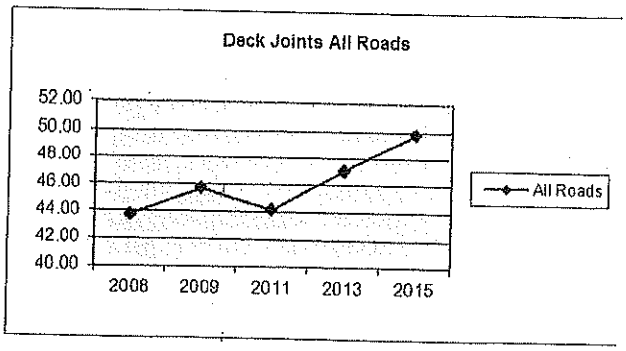


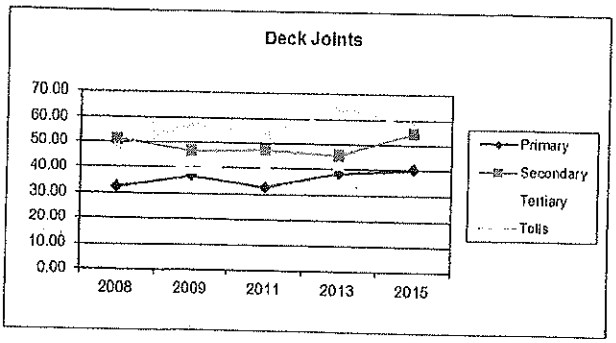


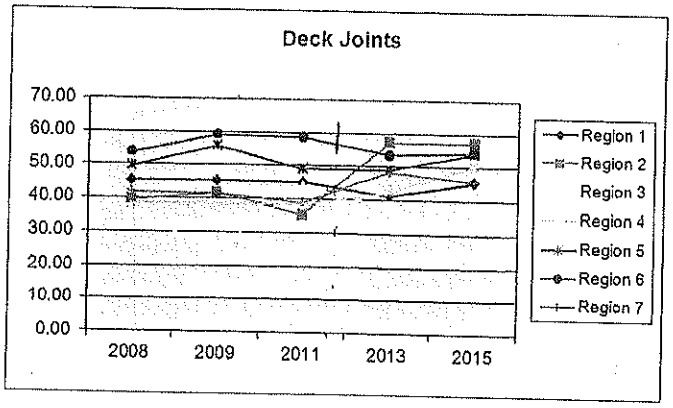


The range was from a low of 73.33 for Toll Roads in Region 5 to a high of 100.00 for Primary Roads in Region 6, with the overall average being 88.895 for Good. Region 1 Primary Roads scored 76.67.75 with several regions scoring in the mid-80s. These scores reflect the continued serious condition of the decks on several bridges within each region due to the failure of the concrete material and continued use of steel plates to provide a temporary surface over the holes in the decks. In the other regions with improved scores is could be seen that work had been completed on the decks, either by patching holes and spalling, or redecking sections of the bridge.

Bridge deck joints ratings have been low for a number of years and continue to be in the 30 to 50 percent Good range. While this is not as critical in Puerto Rico as it would be in colder climates, it still is cause for some concern as the function of the joint could affect the condition of the bridge deck surface by causing spalling and cracking. In some cases where there the entire deck has been overlaid with asphalt, the joints have been completely paved over. Since 2008, when the Authority began a program on cleaning and repairing bridges, this characteristic has shown overall improvement. Since that time the condition has improved 6% to an overall rating of 49.78. While there has been an overall improvement, there has been a 6 % decline in the condition of the joints on the toll roads.







The worst areas for deck joint condition are Region 1, Primary roads with a rating of only 16.67% Good; Region 6 Tertiary Roads with a rating of 30.00% Good; and Region 7 Secondary Roads with a rating of 35.00% Good. There was only one Primary bridge rated in Region 3 and all the joints on this bridge failed. The highest rating of any class was Region 3 Secondary roads with an average rating of 90.00% Good. In general the condition of joints reflect the overall traffic loading requirements as a function of both location (region) and functional class of roadway. For example it is not surprising that bridge joints on San Juan primaries would have lower ratings as the traffic loading is much greater than other regions with much lower traffic volumes.

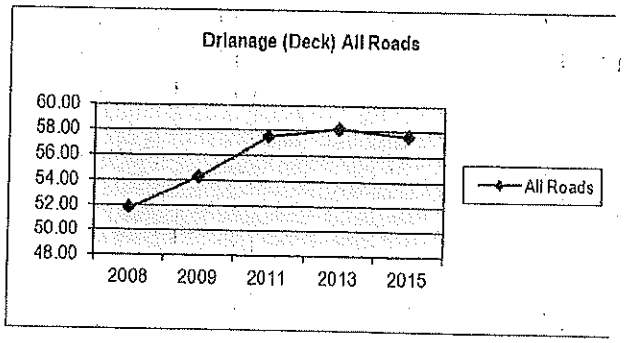
The overall condition of bridge ***sub-structures*** remains very high with a rating of 99.30% Good which is down 0 .06% from last period. Bridges built since the late 1960's are typically made of concrete with over-designed piers and abutments. Concerns regarding sub-structure condition are usually surface spalling of the concrete beams and girders as well as rusting or cleanliness of the bearings or bearing pads. Also, there are several bridges where the deck has been pushed off the bearing surface because of flooding. Problems such as these were found on several bridges over the past several assessment periods and still remain in 2015. The Authority should use the bi-annual NBIS bridge inspection data to identify those bridges that need some clean-up or remediation on the bearing pads and develop an island wide program to take care of these bridges before they get to the point where bearing replacement is required or there is a deck failure.

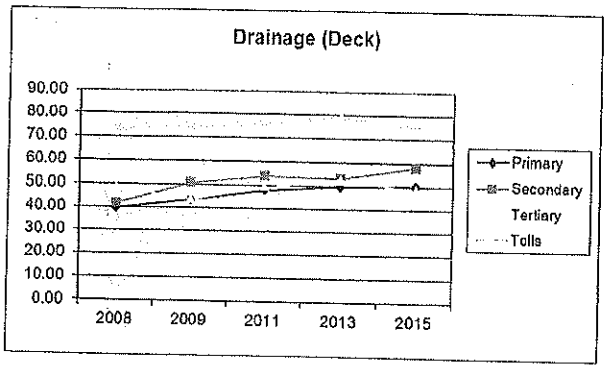
Piers had an overall rating of 97.86 % Good, slightly higher than the 2013 rating. Ratings ranged from a low of 86.67 for Primary Roads in Region 2 to a rating of 100 % Good for

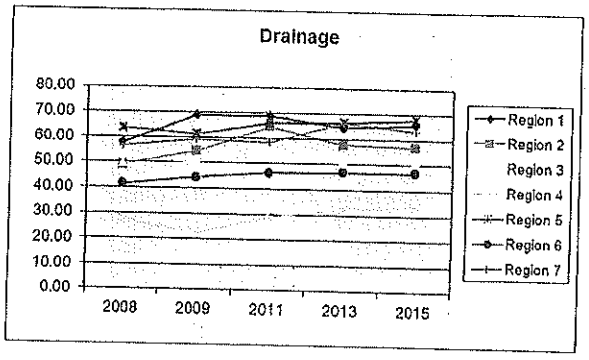
bridges on the Toll roads. Most regions had ratings of between 95% to 100%. Region 7 Tertiary Roads in Region had a rating of 88.33% Good.

Overall ***bridge abutment*** condition ratings showed an increase from 93.99 % Good in 2013 to 94.26% in 2015. Overall ratings by functional class ranged from a low of 91.11 % for Secondary Roads to a high of 97.50% for Toll Roads. This is a small increase in overall condition in each functional class. Region 2 Primary roads had the lowest overall rating of 50.0%. Region 4 had an overall rating of 100% Good. The region with the next lowest rating was Region 6 Secondary roads with 65.00% Good. It should be noted however that these ratings are based on a small sample of only 2-4 bridges in each functional class and specific region. However, it should be noted that the bridge in Region 6 had showed problems of scouring around the abutment had not been repaired since the last evaluation in 2013. This problem should have been identified during the biannual NBIS bridge inspection and scheduled for repair.

Bridge ***deck drains*** provide an outlet for water that accumulates on the bridge deck surface. Typically drains are either side drop-inlets at the curb or drop through pipes (scuppers) in the deck surface next to the curb. They are usually along the curb or against the parapet, but can also be large grated inlets at either end of the deck just outside the expansion joint. In 2015 the overall Good rating lost a little ground by declining to 57.60 %. This was a drop of 0.5%. Primary and Secondary roads made improvements in their deck drainage while Tertiary and Toll roads each dropped.







Regions 2, 4 and 5 made good improvements with Region 7 showing a decline of 11.50 %. The largest overall improvements were in Region 4 with 12.80% and Region 5 with 8.00%. This can be attributed to improvements in the Secondary roads and Toll roads. While there has been some improvement over the past eight years in the condition of the bridge deck drainage,

the overall numbers show that there is still room for significant improvement. Scores for this asset should be improved at least to the 70% Good category.

Parapets/rails are the structures along the edge of the deck that prevent vehicles and pedestrians from falling off the edge of the deck. There are various designs that include concrete barriers, metal or concrete railings and guardrail. Typically this characteristic is in good condition except for isolated cases where vehicles have damaged the parapet through accidents and it has not been repaired. It has been noticed for some years that pipe railing originally installed on top of concrete barriers has been removed or torn out. These areas have not been repaired, either by replacing the railing or cutting off the pipe flush with the barrier. For 2015. the overall rating for ***parapets/rails*** for all functional classes was 97.31 % Good, about the same as 2013. The lowest rating was for Primary roads (93.67%), the same as the previous reporting period; and the highest rating of 99.35 % was achieved by Toll roads, slightly less than the previous reporting period. There were no functional classes within any region that showed any major increase or decrease. This characteristic would not be expected to change much from year to year as it is not prone to excessive wearing and makes up only a small part of the overall infrastructure.

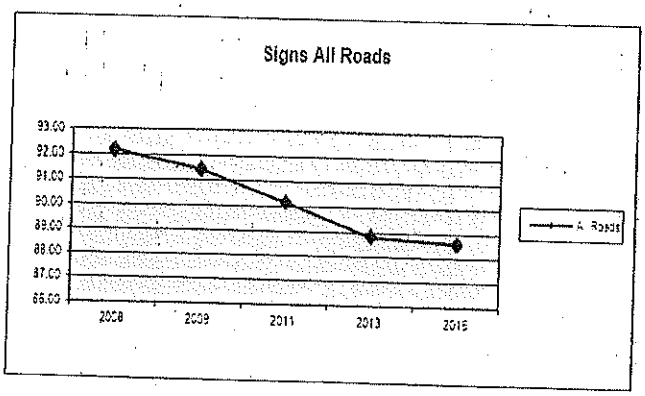
For the purpose of this evaluation, the definition of superstructure has been changed to coincide with that of the NBIS standards. This means that this asset consists of all components below the deck but above the piers and abutments which are classed as part of the substructure. Major components within this category include beams, girders, and bearings. In some cases there are bridges that have deigns that include components above the deck which are main structural components. These types of bridges would be steel truss, cable stayed, and cable tensioned structures. There are currently three bridges of this type in operation. Two are steel truss bridges and the third is cable stayed structure on PR-10 that was completed in 2009. Most of the bridges in the inspection sample had their superstructure in Good condition. Those that had problems were with the bearings or with the bearing pads that the concrete beams rested on. Overall the rating for superstructures was 98.08. It should be noted that then newest bridge (PR-10) had the biggest problem in that the Authority, after NBIS inspection determined that the structural condition of supports for the outside lanes in both directions was not sufficient to carry the initial design load. These lanes have now been closed until a detailed analysis can be performed and a recommended repair completed.

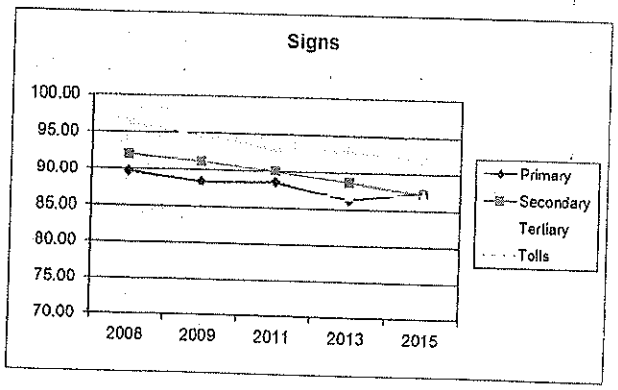
Since most functioning bridge structures in Puerto Rico are made of concrete, ***bridge painting*** is not normally needed. Other reasons for painting parts of the bridge are for aesthetic reasons or to cover up graffiti on abutments, piers, parapets or other areas. It is a tradition in Puerto Rico for municipalities paint the parapets and guard rails leading into the pueblo to signify the towns' colors. Painting is not normally rated unless the girders or trusses are made of untreated steel. Bridge painting ratings can be highly variable due to environmental conditions and random vandalism. This year's overall Good rating of 87.50 % is increased slightly from the last rating period because no improvements were made and no damage during the past two years was noticed although there had been some repainting. The rating of 87.50 is mainly due to the graffiti issue on bridges on Tertiary Roads. This score was 66.67% while the other three systems all scored 100.00%. While the problem has not gotten worse, it has not improved either. In some areas such as San Juan and to the West, the graffiti issue has improved. In the area around PR-52

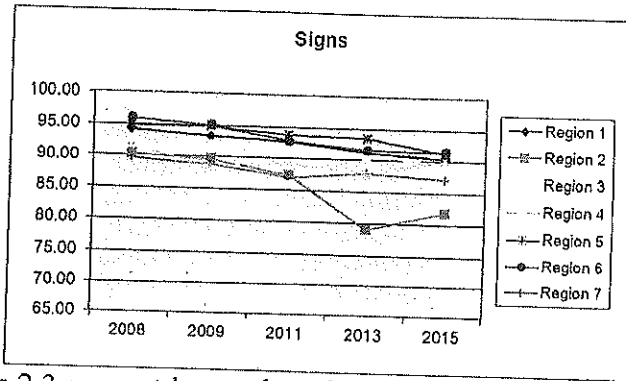
and Caguas the graffiti remains noticeably worse. However, it should be pointed out that the condition of this characteristic does not affect the structural condition of the bridge.

The ***waterway*** characteristic is used to rate the condition of a water channel beneath a bridge. In some cases, the bridge crosses over another road and therefore there is no rating for waterway. Maintenance requirements focus on debris buildup within the channel and around the piers and abutments. The overall condition rating of 98.39 % Good is slightly higher than the previous period. All functional classes received a rating of 96% or higher with Toll road's waterways rated at 100% Good. Functional class roads within Regions receiving the lowest scores were Region 5, Secondary Roads (92.50); Region 7 Secondary Roads (92.86); Region 4 Secondary roads (93.33); and Region 1 Tertiary Roads (93.75). Waterway obstructions can also be seasonal as during the end of the rainy season when debris is caught against the piers due to decrease in water flow. During this evaluation period, the water level was low as there had not been much rain during the previous three months.

The overall Good condition rating for ***signs/reflectors*** gradually declined over the past four reporting periods. This evaluation period showed a slowing of the decline. This years' rating of 88.60% was a very small decline from the previous pervious reporting period. Although not a structural component of the roadway, signs are considered a significant asset due the service they provide motorists. Signs are rated for clarity, structural integrity and correctness. The overall rating of 88.60 is still at the lower range of Good. The Primary and Tertiary Roads showed a modest improvement. Region 5 had the largest decline of 2.4 %. Regions 2 and 3 had improvements of more than 2.00%.

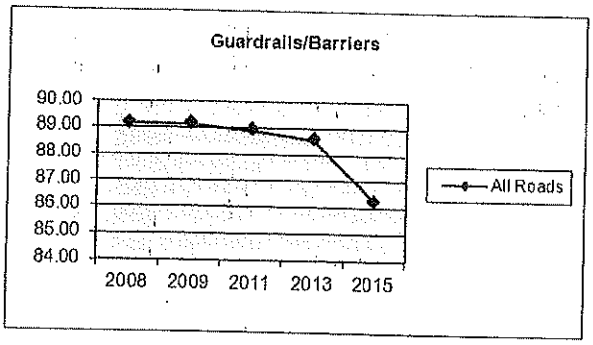


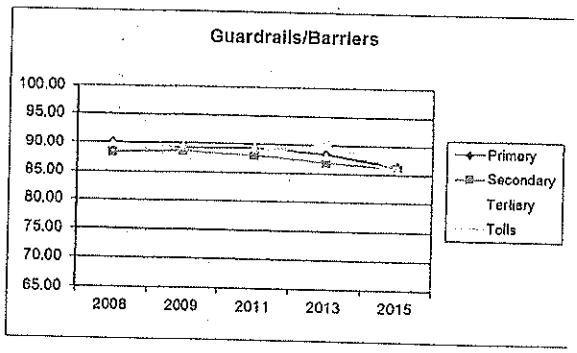


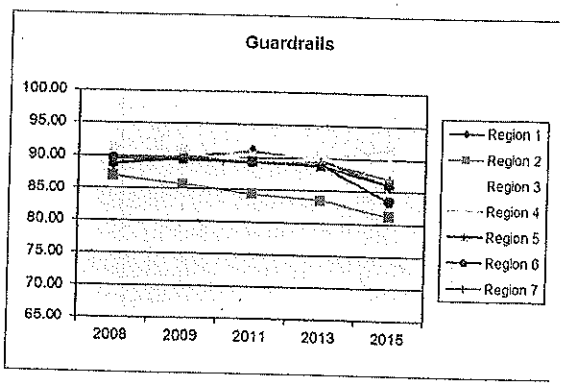


The overall Good rating of 86.22 % for ***Guardrails/Barriers*** was 2.3 percent lower than the rating for 2013. As seen from the graph below, the drop is significant compared to the previous four rating period. A review of the

composite ratings for the last five years shows that the overall condition of guardrails/barriers had been on a very modest decline over the past five years, but has made a significant decline this past reporting period. While some new guardrail was noted, particularly where other construction has taken place, there remains a fair amount of unrepaired rail on all functional classifications. The Tertiary Roads have the lowest condition level with an overall score of 85.93 which is down more than 2 points from the previous period. Primary roads declined 2 points and Toll roads declined 4 points. The regions with the greatest change were Region 1 with a decline of 4 points; Regions 6 with a decline of 5 points; Region 7 with a decline of 3 points; and Region 3 with an increase of 3 points.

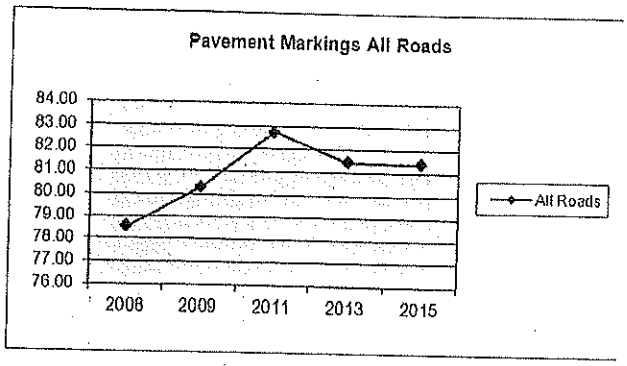


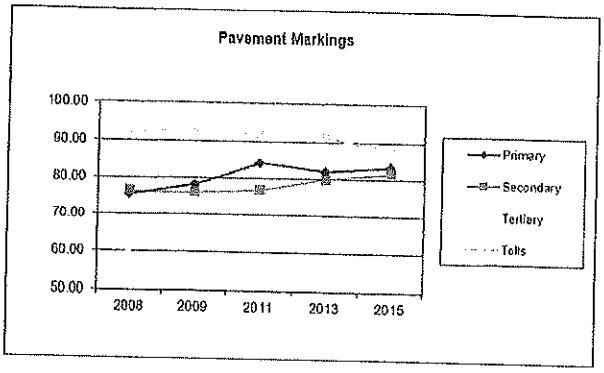


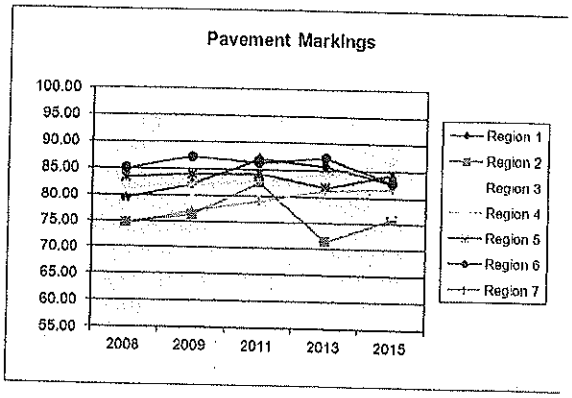


Based on observation during the field assessment, it appears that guardrail is only being repaired or replaced during the repair or rehabilitation of other major assets in the same location.

Pavement marking standards require edge-line painting on all roads with a pavement width of five meters or more. Centerline painting and edge-line painting is required for all roads with a pavement width of 6 meters or more. The Authority uses both painting and thermoplastic application for marking the pavement. After several years of improvements, the rating declined in 2013 to 81.44 %Good. The change from 2013 to 2015 was very small with the current rating being 81.41%. While the Primary, Secondary and Tertiary roads all improved, the Toll roads declined by 4 % to 87.65, its lowest rating for the past 10 years. Five regions had pavement markings decline while two regions improved. Regions 2 and 5 had improvements of 4 % and 3 % respectively. Region 4 had the biggest decline with 4 %.







The locations with the lowest ratings for this evaluation period were Region 7 Tertiary roads with a rating of 53.33 % and Region 2 Tertiary roads with a rating of 52.61%. There were seven locations with ratings in the 70's and only two locations with ratings in the 90's. The lower ratings for the Tertiary roads is not surprising given their lower priority rating, however in Region 2 the Tertiary roads received 30.56 % Poor rating and Region 7 Tertiary roads received a 33.59 poor rating.

Only road sections that include ***traffic signals*** are rated for this characteristic. Of the 1315 km in the total sample, 500 km had any type of traffic signal. It is noted that several sections had new traffic signals installed during the last two years. Overall traffic signal ratings are high for all functional classes of roads as this appears to be a priority within the Authority. The overall condition rating for 2015 is 99.50 % Good which basically the same as the rating of the previous evaluation. All functional classes had a Good rating of 98.00 % or better. Region 7 had the highest overall rating of 100.00 % while Region 6 had the lowest rating of 97.45 %

Only sample sections that include ***overhead signs*** are rated for this characteristic. Overhead signs are located mainly on Primary Roads and Toll (Expressway) Roads with a large majority being on the expressways. Most of these are in or around the San Juan and Ponce areas where there is the largest concentration of these roads. Typically, overhead signs remain in good condition because they are not damaged by accidents or targeted for graffiti. The main problem is due to wind damage from tropical storms although graffiti is becoming more of a problem. Overhead signs on the Expressway roads achieved a 100 % Good rating overall. There were several overhead signs on the Secondary roads that also received a 100 % Good rating. The remainder of the *overhead signs* are on the Primary roads within Region 1, San Juan. During this

inspection period, the backs of several signs on the Primary roads had been painted with graffiti. As there were no severe storms during the past four years, there were no signs that were bent or broken.

Summary of Condition Ratings for Tren Urbano

The maintenance evaluation of the Tren Urbano consists of looking at 6 different elements divided into 42 different maintenance features. Since the current operating portion of the System is only 17.2 km long, an inspection of the total length of line was made along with six stations selected from the existing 16 operating stations. The six stations inspected this year were Martinez Nadal, Bayamon and Centro Medico, Cupey, Universidad, and Hato Rey The three stations that were inspected in 2013 were Martinez Nadal, Bayamon and Cetro Medico. In addition, data and information was received from the contractor who operates and maintains the Tren Urbano System. Figures 2-11 and 2-12 show the ratings for the evaluation effort relative to the facilities inspected. The rating for the stations characteristics are composite ratings calculated by averaging the individual ratings for each of the three stations into one overall value, similar to the approach for determining the average rating of roads and bridges by functional class or region.

Figure 2-11
Station Evaluation Ratings

Features	Good	Fair	Poor
A. Parking and Driveways			
1. Pavement	95	5.0	
2. Curbs & Sidewalks	95	5.0	
3. Drainage	95	5.0	
4. Striping	10	5.0	85
5. Lighting	100		
6. Signs	90	10	
7. Landscaping/Turf	90	10	
8. Fence	100		
B. Building Exterior			
1.Walls	95	5.0	
2. Doors	95	5.0	
3. Trash Receptacles	97	3.0	
4. Belotos	97	3.0	
C. Building Interior			
1. Walls	95	5.0	
2. Floors	97	3.0	
3. Ceiling/Roof	90	10	
4. Windows	95	5.0	
5. Escalators/Elevators	95	5.0	
6. Message Boards	97	3.0	
7. Water System	93	7.0	
8. HVAC	n/a		

9. Lights	93	7.0	
10. Emergency Lighting	100		
D. Train Platform			
1. Floor	95	5.0	
2. Ceiling/Roof	95	5.0	
3. Benches	100	1.7	
4. Entry Edge	93	7.0	
5. Lights	97	3.0	
6. Trash Receptacles	100		

Figure 2-12
Cars and Throughway Evaluation Ratings

Features	Good	Fair	Poor
A. Cars			
1. Doors	100		
2. Lights	100		
3. Seats	95	5.0	

4. Floor	95	5.0	
5. PA System	100		
B. Throughway			
1. Track	100		
2. Track bed/Ballast	100		
3. Drainage	98	2.0	
4. Vegetation Control	95	5.0	
5. Slopes	97.5	2.5	
6. Tunnels	96.6	3.4	
7. Elevated Structures	96.6	3.4	
8. Fencing	95	5.0	
9. Retaining Walls	98.3	1.7	

Since the system is only eight years old, one would expect conditions of the assets to be good. As can be seen from the composite ratings there are several characteristics that have started to decline either due to wear, lack of follow up maintenance. If the ridership had been at the level originally anticipated, the condition of several characteristics such as trash receptacles, seats and the cleanliness of the floors might be even lower due to additional use, however after eight years, the maintenance staff still keeps these areas clean. During this year's inspection, Jorgensen was able to observe several maintenance operations taking place. These included cleaning of floors, lighting repairs and landscaping maintenance. With the condition of the stations inspected in overall Good condition it should be expected that the level of maintenance currently being carried out should be adequate until the level of ridership has increased by 30-40 percent. Now that ATI has gotten their project extension for another five years, they assured us that they would continue the maintenance to the highest level, even though they have to reduce their annual budget, which includes maintenance.

Stations

Landscaping /turf around the stations is extensive and is generally well maintained. This was all included in the design and construction of the original facility. Some areas are now beginning to show signs of overgrowth, particularly areas that are adjacent to other businesses, while others have damage due to people taking short-cuts through landscaped areas. There are also other small areas or hedge rows where litter accumulates due to being blown into hedges and low vegetation. This creates dead vegetation which has not been removed or replaced. It was noted that at several of these locations, low level fencing has been installed to prohibit or reduce the foot traffic. However, the foot traffic has now begun to damage the fencing.

Building interior walls appear to be structurally sound but are not finished well and in some cases joints are not properly sealed. Some interior walls show signs of leakage from around windows or from roof/wall joints. This has been repaired in some areas but requires continued

maintenance and clean-up. Also, walls have become soiled where other work has been performed or where bird droppings have not been cleaned up.

Ceiling/roof conditions are good considering the amount of surface that must be maintained. While some of the leaks noted from previous inspections have been fixed, there are several new areas that have appeared during this inspection period. Roof leaks are hard to repair because the water intrusion may not be obvious from the roof surface. For the stations with the worst problems it is recommended that the roof be recovered with at new coat of mastic.

Building interior windows – Several windows in the stations inspected have cracks or slipping panes. These windows are higher up and must be reached using a ladder, however replacement of most of the glass is not difficult and should be done quickly to reduce damage from the elements and birds. Lower level windows need to be cleaned.

Escalators/elevators – Every station has some type of automated lifting device because all train platforms are either below or above grade. Escalators in stations visited were working, but one elevator was under repair.

There are many ***building interior lights*** and many of them are located in high ceilings that are difficult to access. Because it was daytime and some of the lights were turned off to conserve power, therefore a correct count of light failures could not be determined. While there were some lights that were obviously burned out, all stations were well lighted and there were no areas where additional lighting is required. Lens on some lights are beginning to discolor due to environmental conditions. These should be replaced to provide more efficient lighting.

Train platform floors are constructed of ceramic tile over concrete. Previous inspections showed that grout between some tiles was beginning to disintegrate, causing tiles to become loose. Small hairline cracks are also appearing on edges of platforms. All platforms visited showed good repair.

Tracks and Right-of-Way

Observation along the tracks identified several areas that are of concern. The ***tracks*** include the rails, ballast, switchgear, and wiring. At several locations there appeared to be wiring that was not properly tied down and out of the tray used for supporting the run.

Drainage along the track bed and within the right-of-way is similar to that used along roadways. Open ditches, drains and culverts provide drainage away from the track bed and surrounding areas. Several drainage areas along the track had vegetation build-up that restricts the flow of water. Ponding at several locations was visible. These need to be cleaned of all vegetation and the material removed. There should be no standing water in the ditches.

A portion of the track runs through areas where there are open cuts of up to 30 feet. A number of these areas are landscaped with vines and ornamental grasses. At several locations, ***slope*** erosion was noted mainly due to cutting the grass too short. Also, some areas show weed and grass intrusion and should be cleaned.

Striping in parking lots and at access crossing to the stations has faded and cracked. This is normal aging of striping material placed over asphalt pavement. These areas need to be restriped to make a clear demarcation for pedestrians traveling to the stations.

Based on inspection of the characteristics identified above and evaluation of the condition of the selected samples, maintenance and follow-up repair activities are sufficient to keep the Tren Urbano and its supporting facilities in good operating order. The programs that have been put in place by ATI should ensure proper operation and maintenance of the system for a number of years. Operation of the train continues to fall within the operating requirements of ACT and records show the performance to be at a high level.

Maintenance Budget Review

Figure 2-13 shows the expenditures for maintenance on Primary, Secondary and Tertiary roads and bridges for the past 15 years with a projection of the funding through FY2018. Figure 2-14 show the maintenance expenditures Toll Roads for the same period. For Public Works expenditures in Figure 2-13, landscaping, traffic control, design and other indirect public works activities are not included as part of these values. The forth column from the left in Figure 2-13 includes an adjustment of expenditures, based on the Puerto Rico Consumer Price Index which is based on Federal Government statistics with 1984 being the base year through 2006. A revision of the CPI calculation was made by the PR Department of Labor and Human Resources effective December 2006. The US Bureau of Labor Statistics found that the old calculation procedure had a significant overstatement of the inflation rate. Therefore, the CPI values from FY2006 through 2010 shown in previous reports have been adjusted downward to match the new calculation procedures and revised CPI as reported by the Bureau of Labor Statistics (BLS). Expenditure values were also adjusted based on new documentation provided by PRHTA.

To obtain equivalent expenditures in constant 1984 dollars the current expenditure is multiplied by that years CPI. The CPI used in the current calculation is 113.983. This CPI uses 2006 as the base year. Converting to the 1984 base, the equivalent value is 234.619. The last two columns in the figure are a comparison of current dollars per kilometer expended versus dollars per kilometer adjusted for inflation based on the CPI. Therefore, the last column shows the cost per kilometer for maintenance and operation from either actual expenditures or projected expenditures (based on five year CIP) is constant dollars.

Beginning in 2011 there was a dramatic increase in expenditures for non-toll roads due to the influx of funding available from the 2010 bond issue. This only lasted for one year although the CIP at that time programmed these higher levels of expenditures for several years. The planned expenditure for 2011 was $234.85. This was a four-fold increase from the 2010 amount of $28.16 million. The FY 2012 maintenance expenditure for all non-toll roads was targeted to be $171.8 million, but unfortunately fell back to earlier levels with a modest increase from 2010. The average expenditure per kilometer (in constant 1984 dollars) then increased from $2,268/km in FY 2009 to $12,639/km in FY 2011, which is six fold increase. This was a huge increase from the previous years but was only planned to last for two years before it returned to a modest increase in 2013 compared to the years previous to 2011. Although it was a one-time program, it did not provide the deep thrust that was originally planned and it only lasted one year. While it

did provide some economic boost for some parts of the island, it was not very effective in addressing many of the maintenance issues existing on the roadways.

Over the past four years the average increase in the CPI has been reduced to between 1.5 to 2.7 %. This is a slowdown from the previous average calculated in 2009. This slowdown continues to reflect the poor economic conditions that have prevailed throughout the Commonwealth and the US in general over the last six years. The Government has enacted a new economic plan to achieve fiscal stability for the large amount of debt currently existing. This called for budget cuts, job reductions and other belt tightening measures over the next three years. According to the Government Development Bank, GNP has been decreasing at approximately 3.6% during the past three years and only sees a slight increase in the near future (2012-2014).

The projected expenditure for FY 2013, expressed in terms of constant dollars shows a decrease in non-toll road maintenance to $1,946/km from the previous year of $2,045. These amounts are more than 80 % less than the 2011 amount. If the one-time funding of 2011 is removed, the values are more on track with what would be expected given the revenue base that is available to work with. Also, more realistic forecast values for the economy have been made available. This includes a reduction of revenues available from oil and gasoline products.

Revenues from gasoline taxes are projected to remain steady during the next five years, while total 1968 Resolution Revenues are projected to make a slight increase through the Federal Government or other methods such as increase in tax rates. According to government reports, the Commonwealth continues to consider increases to several types of taxes that would provide additional revenue if dedicated for use in transportation.

Considering the projected values for the period FY2014 through FY2018, the average expenditure per year is approximately $40,000 million for non-toll roads and $19,000 million for toll roads. For non-tolled roadways there is also a contingency of approximately $3,600,000 set aside. These values are lower than the earlier 2009 projection. Using the revised CPI forecast values, the adjusted average dollars per kilometer to be expended on the non-toll roads is $2,100 which is slightly less than the values for 2007-2009. However, they are on track with an overall average for period 2001 through 2013, excluding the 2011 large expenditure. For toll roads the average dollars per kilometer expenditure for the 2014 to 2018 period is approximately $30,000 which is about 25% less than the average values of the early 2000s. The decrease in both toll roads and non-toll roads is attributed to the overall financial difficulties the Commonwealth is experiencing as well as the correction to the CIP values downward. While this downward correction to the CPI calculation provides more relative funding in 1984 dollars (the basis used for the comparison) is does also reflect the poor state of the economy on the island. While the government must address the funding shortfalls throughout the Commonwealth, it must also address the need for maintaining its infrastructure in order to help improve the economic situation. It must find additional sources of revenue to at least stabilize the operations and maintenance of the road network.

In January 2009, the Government began to implement a multi-year plan designed to achieve fiscal balance and restore economic growth. This plan sought to achieve budgetary balance on or before fiscal year 2013, while correcting fiscal deficits in the short term by implementing a number of initiatives including: a gradual reduction of $2 billion in operating

expenses, including payroll; a combination of temporary and permanent revenue raising measures, coupled with additional tax enforcement measures; and a bond issuance program through COFINA. To date a number of measures have been put in place including: an organizational restructuring of PRHTA saving approximately $7 million per year; a reduction in the toll leakage through modernization of toll equipment therefor adding approximately $12-15 million per year in revenues; capture of additional federal funding for road and bridge improvement (approximately $11.5 annually). This however has not been enough to stop the flow of funds needed to pay for other dedicated programs such as government pensions and health care.

Puerto Rico was awarded approximately $6.5 billion in stimulus funds under the AARA program. Of this amount, $105 million was allotted for roadway reconstruction and rehabilitation. These funds were originally programmed to be spent from FY2009-FY2011. Most of the projects in this program were for pavement and bridge deck rehabilitation and ended in 2013.

Other strategies are being implemented to keep the costs at manageable levels for transportation infrastructure. These include the use of Public Private Partnerships (P3) for operation and maintenance of selected toll facilities and the conversions of some existing roads from Primary to Toll Road. The first of the toll road concessions went to close in September 2011 and has proven to be a successful effort for the Concessionaire. Other concessions were planned for the remaining existing toll roads and the planned extensions of the network in the future but are currently on hold by the new government administration. The use of a P3 strategy allows ACT to maintain overall control of the facility while shifting the responsibility of operation and maintenance a Concessionaire. Upgrading existing facilities such as PR-2 in Ponce to toll facilities, provides the opportunity to use capitol funds for the improvement and create a new source of revenue to pay for operations, maintenance and dept repayment.

Figure 2-13
Public Works Maintenance Expenditures

Fiscal Year	Amount 4/ Expended	Price Index 5/	Expended (1984 $)	Road Kilometers	$ / Km (Current $)	$ / Km (1984 $)
2000	$23,382,341	174.2	$13,422,699	7,000.0	$3,340	$1,918
2001	$25,177,000	188.6	$13,349,417	7,000.0	$3,597	$1,907
2002	$24,999,000	197.1	$12,683,409	7,000.0	$3,571	$1,812
2003	$26,200,000	212.5	$12,329,411	7,000.0	$3,743	$1,761
2004	$26,775,000	221.4	$12,093,495	7,000.0	$3,825	$1,728
2005	$23,517,400	225.0	$10,452,177	7,000.0	$3,360	$1,493
2006	$26,546,175	229.6 5A/	$11,561,922	7,000.0	$3,792	$1,652
2007	*$41,628,440*	*234.6*	$17,744,433	7,055.0	$5,900	$2,515
2008	*$48,588,550*	*246.8*	*$19,687418*	*7,055.0*	*$7,140*	*$2,791*
2009	*$39,597,635*	*247.5*	*$15,999,044*	*7,055.0*	*$5,613*	*$2,268*
2010	*$28,161,999*	*253.7*	*$11,100,512*	*7,055.0*	*$4,729*	*$1,757*
2011	*$234,850,000*	*261.7*	*$89,170,160*	*7,055.0*	*$33,288*	*$12,639*
2012	*$37,199,849*	*264.5*	*$14,442,286*	*7,061.0*	*$5,268*	*$2,045*
2013	*$37,013,963*	*269.0*	*$13,759,837*	*7,071.0*	*$5,235*	*$1,946*
2014	*$40,889,106*	*274.4*	*$14,901,277*	*7,071.0*	*$3,336*	*$2,107*
2015	*$41,675,502*	*279.8*	*$14,894,746*	*7,071.0*	*$5,894*	*$2,107*
2016	*$41,725,502*	*285.5*	*$14,614,886*	*7,071.0*	*$5,894*	*$2,067*
2017	*$41,725,503*	*291.2*	*$14,328,812*	*7,071.0*	*$5,901*	*$2,026*
2018	*$41,725,501*	*296.9*	*$14,053,722*	*7,071.0*	*$5,901*	*$1,988*

4/ Does not include landscaping, traffic control or design.
5/ Consumer Price Index for all families in Puerto Rico (Base Year 1984 = 100). 5A/ New base year with adjustments by BLS in December 2006.
6/ Decrease due to transfer of maintenance responsibility for some Commonwealth roads to municipalities.
7/ FY2011 to 2015 are projected values by PRHTA based values derived from CIP.

Figure 2-14
Toll Road Maintenance Expenditures

Fiscal Year	Amount Expended	Price Index 8/	Expended (1984 $)	Road Kilometers	$ / Km (Current $)	$ / Km (1984 $)
2000	$19,509,000	174.2	$11,199,196	263.0	$74,179	$42,582
2001	$20,722,000	188.6	$10,987,275	263.0	$78,791	$41,777
2002	$21,060,000	197.1	$10,684,932	263.0	$80,076	$40,627
2003	$21,902,000	212.5	$10,815,802	263.0	$83,278	$41,125
2004	$26,107,000	221.4	$11,791,779	263.0	$99,266	$44,836
2005	$22,034,490	225.0	$9,793,107	263.0	$90,087	$40,039
2006	$26,745,910	229.6 12/	$11,648,915	283.1 10/	$101,695	$44,100
2007	$23,308,362	234.7	$9,934,558	283.1	$82,333	$35,092
2008	$32,198,210	246.8	$13,040,815	283.1	$113,706	$46,064
2009	$33,571,753	247.5	$13,562,755	283.1	$118,586	$47,908
2010	$39,400,000	253.7	$15,533,092	283.1	$139,173	$54,868
2011 9/	$54,248,787	261.7	$20,782,825	295.8 11/	$183,397	$70,077
2012	$5,466,528	264.5	$2,066,740	208.1	$240,490	$9,932
2013	$18,812,155	269.0	$6,993,366	208.1	$245,299	$33,606
2014	$19,262,372	274.4	$7,019,814	222.1	$86,728	$33,733
2015	$19,430,838	279.8	$6,944,545	222.1	$87,487	$31,268
2016	$19,455,839	285.5	$6,814,655	222.1	$87,599	$30,682
2017	$19,455,838	291.2	$6,681,263	222.1	$87,599	$30,082
2018	$19,430,839	296.9	$6,544,574	222.1	$87,487	$29,467

8/ Consumer Price Index for all families in Puerto Rico (Base Year 1984 = 100).
9/ FY 2011 to 2013 are projected values by PRHTA based on latest CIP.
10/ Addition of Eastern Corridor
11/ Conversion of PR-2 to Expressway at Ponce: Removal of PR-22 and PR-5 from Authority responsibility: Addition of PR-66 extension.
12/ New version of CPI used with Dec. 2006 being new base of 100.0

CONCLUSIONS AND RECOMMENDATIONS

Conclusions can be drawn from the data assembled as a result of the inspections performed. While the overall functional road systems appear to be in good shape, there continues to be concern with regard to the maintenance of several specific characteristics. These areas would benefit from a maintenance program targeting these items on a more regular basis. Based on these conclusions, recommendations have been made for the specific maintenance applications.

Conclusions as to the Adequacy of Maintenance Being Performed

Based on the results of analysis of the data from the field evaluation for FY-2015 and the review of the maintenance expenditures, it is concluded that the level of maintenance being performed on the overall road network and the Tren Urbano is generally adequate to preserve the investment in these traffic facilities for the near term. On the whole, increases and decreases in the condition ratings shown earlier in this section of the report are within acceptable limits for fluctuations in maintenance of the various types of facilities. Where there are a few characteristics that are below the minimum Good level, (bridge deck joints and bridge deck drains), they are non-structural in nature and do not affect the safety or structural integrity of the infrastructure. While there is a general trend in declining conditions of some characteristics, it has been at a very gradual rate. If the economy continues for decline, it is assumed that the traffic volume will also decline, thus reducing the deteriorating effects of the system. On the other hand, it is noted that beginning in 2011 the government has used only a small amount of funds from the payment of the concession agreement for road and bridge rehabilitation and repair. This includes funding for some general maintenance, but has gone mostly to special programs such as the BRT and other construction.

By reviewing the same locations from year to year and making extensive notes on specific situations that are observed, a database of maintenance activity and conditions at specific locations continues to be compiled. This is used to identify both continuing problems as well as improvements from time to time. The condition ratings not only provide a snapshot of the adequacy of the maintenance at a point in time, but also provide some indication as to whether maintenance efforts are improving or declining when compared with previous years. This can then be compared to available funding to determine what effect it may have on levels of service and performance standards.

The level of maintenance expenditures is primarily dependent on the amount of funding received from a variety of sources as specified in the 1968 Resolution. Pledged revenues such as gasoline tax and toll revenues can vary from year to year depending on the state of the local economy and other factors. Other sources of funding come from Federal Aid and private sector financing in the form of municipal bonds. Also, the 1968 Resolution allows the Authority to "borrow" funds from the Construction Fund as required to make necessary repairs. A review of the historical and projected revenue and expenditure data shows that traditional maintenance funding has had difficulty keeping up with inflation and maintenance expenditures on a dollar per kilometer basis when

adjusted for inflation are at a level that can provide to improvements to existing service levels.

While the overall level of maintenance was determined to be adequate to preserve the existing facilities for some time, there are several situations where the level of maintenance on specific characteristics is of concern. The list below is not new as these conditions have existed in some form for many years. They include the following:

- Pavement Surface

  The overall rating for pavement surface during this evaluation period dropped slightly less than one percent from the previous inspection period in 2011 but has shown a steady decline over the past the past seven years. All classes of roads showed a very similar amount of about one percent. While new or reconstructed roads provide for higher ratings, the older sections continue to deteriorate at an accelerated pace. Deterioration, especially on the Tertiary Road system could be due to truck overloading or drainage issues. With the new paving initiative funded in part by the ARRA, ratings are expected to show some improvement.

- Ditch Maintenance

  Overall ditch conditions decreased slightly from the previous inspection. This year's rating remains much improved from six years previous. However, overall conditions could still be improved to accommodate the heavy rains and potential hurricanes that visit the island on a regular basis. The drainage problems and erosion caused by the tropical storm of September 2008 have been repaired and in some cases the areas markedly improved. This is particularly true for Tertiary Roads where the overall rating remains at 70.8. Areas at the bottom of long cut slopes are of particular concern as are rural areas in general where there is much vegetation dropped into the ditches.

- Vegetation Control

  Vegetation control is becoming a problem once again. It is not known whether the emphasis has shifted away from the characteristic or that the change in the inspection schedule may affect the rating due to different conditions observed in November as opposed to early spring. Two areas where there conditions have declined: overall grass height on toll roads; and vegetation along shoulders on Tertiary roads. The later condition is a potential safety hazard due to its effect on guardrail installation. There may be a correlation between the recent reduction in PRHTA staff with maintenance work effectiveness such as vegetation control. The one positive feature noticed recently is that more herbicide application is being used to control vegetation.

- Bridge Decks

  While the overall bridge deck rating is up slightly from the previous year, the significant decrease in 2008 was the lowest rating in the past five years. The overall rating of 88.83 is not bad, however, specific problems with bridge decks on specific road classes or in specific regions should be of concern. Primary Roads had the lowest overall rating with 78.71 Good..

  Bridge deck rating fell in three regions with Region 4 Primary roads having the lowest rating of 63.75 Good. Bridge decks continue to show signs of wear and aging. Steel plates are still in place on several bridges after four or more years. However, while repairs have been made to several bridge decks on PR-22 and other toll roads, new plates have appeared on bridge decks in Regions 1 around San Juan and Region 5. As stated in past reports, it would appear that some of the problems relative to deck failure are due to high traffic loading and overloaded heavy duty trucks. These overloaded vehicles have been observed by the inspection crews on numerous occasions over the past years. Also, the Authority must be diligent during construction of new bridges or rehabilitation of existing decks in that proper construction techniques must follow the required designs. Hopefully, the deck repairs programmed with the ARRA funds with eliminate the most serious of these problems and PRTHA will redouble its efforts to enforce truck load weight.

- Bridge Deck Joints

  There has always been a problem with bridge deck joints. This is because they are considered by the maintenance crews as a relatively low priority in the overall plan. Many of the bridge deck joints inspected still have the same problems as observed in prior inspections going back more than five years. Proper maintenance of joints is necessary to allow free expansion and deflection of bridge decks. This is not as serious a problem for Puerto Rico as the climate does not include a large fluctuation in temperature that results in cracking and spalling at the joints. This past year there was an improvement in the overall deck joint rating, however it is still quite low. The overall value is still too low and must be improved in each region and in all classes.

- Bridge Deck Drainage

  After one year of decline in bridge deck drainage (2008) the overall rating has significantly improved since then. In 2011, the rating improved by +6.5% and again about +1.2% in 2012, but still stands at only 58% overall. The rating for this characteristic has been low for many years. Emphasis needs to be on deck drains on Tertiary Roads and on all roads in large urban areas where litter accounts for most of the blockage in the

scuppers. The reason for these overall low ratings appears to be the clogging of the drains and scuppers with leaves and vegetation in the rural areas and cans and fast food wrappings in the urban areas. Again, this maintenance activity does not appear to be a priority among the maintenance crews, however if the decks do not drain properly this could cause water ponding on the road and result in unsafe driving conditions.

- Guardrail

  The overall rating for guardrail has been in gradual decline for the past five years. In FY2004 the overall rating was at 92.46 % Good with all functional classes having a score above the 90 % Good level. In FY2013 the overall ratings is down to 88.57 % Good with all roads scoring below the 90 % level. Ratings in all regions except Regions 4 and 6 showed slight declines. From this year's inspections it appears that a number of damaged areas during the last year still need to be repaired while additional new damage is added to the backlog.

- Signs and Pavement Markings

  The overall rating for signs has declined since 2007. The overall rating of 88.83 Good for FY2013 shows that the characteristic has continued to be maintained but specific locations are falling behind. Ratings for Toll roads have steadily declined from a Good rating of 99.62 in FY2004 to a rating of 93.1% in FY2013. All classes of roadways declined slightly from 2008 to 2009. Graffiti on signs is becoming a more noticeable problem.

  Pavement markings remain a concern, especially on Tertiary roads in rural areas. Thermoplastic markings are beginning to turn brittle and flake off on Toll Roads and Primary Roads. Edge striping continues to be a problem along these roads particularly in Regions 2 and 7.

Recommendations for Maintenance Activities

Recommendations are made relative to the findings and conclusions derived from the general maintenance evaluation performed in 2013 and summarized above. Most of these recommendations are similar to those provided in previous reports because no visible improvement has been observed relative to the specific conditions noted in the earlier years; or the same conditions reappear on other roads at different locations. The recommendations are provided in no particular order of importance.

- As the **infrastructure continues to age**, more maintenance on the supporting components of the road and bridge systems needs to be carried out. These include such characteristics as shoulders, bridge abutments and drainage. This is compounded by an increase in **traffic volume** and the number and weight of commercial trucks. The Federal Highway Administration estimates that

truck traffic in Puerto Rico will increase by as much as 65% from 1997 to 2020. If the economy does not recover, the estimates may be half of these values. The Authority must find ways to increase maintenance funding levels or come up with more **effective alternative maintenance strategies** in order to mitigate the problems caused by the aging process. It is hoped that some portion of the new sales tax and other possible taxes that are being discussed could be used for maintenance and rehabilitation purposes. Alternative strategies could include organizational realignment to focus on the worst case first, or contracting out maintenance on a unit price basis or setting aside areas or designated lengths of specific functional classes of roads to be maintained through the asset management strategy.

- For the Tren Urbano, the O & M Contractor needs to continue its efforts to keep the maintenance of the facilities at a high level. This will improve the longevity of many characteristics and may improve the popularity of the system to the general public. Security and cleanliness are two basic characteristics that the public expects from such a system. Other areas where concentration is needed are mechanical systems such as elevators and escalators.

- Focused programs for repairing pavement markings should be developed and implemented for the Tertiary roads in Regions where there where there are high accident and incident levels. Accident statistics and traffic studies would identify the specific locations. Initial focus should be on rural mountainous areas and sub-urban areas where PR routes run through built-up areas.

- Repairs to areas where there have experienced landslides and cave-ins still need to be repaired as soon as possible to get the roadway back to full operating capacity. In the past this has not been the case. There continues to be damage caused by landslides on both cuts and fills due to tropical storms. While many of these areas have been repaired, other locations remain barricaded or detoured causing traffic as well as safety problems.

- A program to inspect and monitor bridge decks needs to continue if not be accelerated. The concern is focused particularly on stress cracking and pop-outs. The deck failures experienced on several high priority bridges in recent years can be expected on other bridges where high traffic loading due to over-weight trucks or poor construction practices exist. While several bridge decks have been replaced, additional effort is needed to keep up with this problem as it is noted that there are additional areas where steel plates are being used. This would involve more effective short term temporary repairs as well as permanent rehabilitation or reconstruction.

- Bridge deck joint cleaning and seal repairs on all road classes throughout all regions remains a concern. Neoprene seals are seen completely out of the joint and ripped away by the traffic. In other areas the seals are completely missing.

While here is no concern for damage due to a freeze/thaw cycle, the lack of a good seal allows dirt and rocks to settle in the joint, making the edges susceptible to spalling which in turn allows for additional debris to collect in the increasing larger pothole. A special, one-time program of repair or replacement of joint seals needs to be developed and implemented on a Regional basis. More frequent cleaning of the joints will also help to preserve the seals.

- While vegetation control on the Toll Road system remains at a high level, control on the other classes of roads continues to be irregular, particularly on the Tertiary Roads. In some cases, local residents have taken responsibility for cutting brush along the road. In other cases, nothing has been done for several years on long stretches of road in the rural mountainous areas. While cutting vegetation too short can kill the plants and lead to erosion, doing nothing can lead to overgrown guardrails, signs and ditches causing safety hazards. A more standard approach needs to be formulated and implemented across all regions.

Chapter Three

MASTER PLAN AND CONSTRUCTION PROGRAM REVIEW

OBJECTIVE

The objective of the Construction Program review, required by Resolutions 68-18 and 98-06, is to review any supplements or revisions made by the Authority to the Transportation Master Plan or to the Authority's Five-Year Construction Improvement Program (CIP) and offer recommendations on any supplements or revisions which may be made, including any necessary repairs, renewals or replacements.

The program review includes a review of funding projections along with recommendations for any revisions that might be appropriate. The procedures for carrying out this review are summarized below.

PROCEDURES

The procedures fall into several categories that apply to both the CIP and to the Master Plan. As the Master Plan is only updated or a new plan produced periodically, there may be not changes for several years and therefore no new comments on this document. Timing of the production of this report is also dependent on the availability of the annually updated CIP. While there is a conscience effort to carry out the field evaluation of the during relatively the same time each year, the overall evaluation of the Authority's maintenance and operations program is dependent of the availability of the CIP. This past year there was a delay in finalizing the CIP, with the final version not being available until October 2013.

Data Collection

Information and data were collected from the various offices of the PRHTA as well as the Commonwealth Government in general. This included the current Puerto Rico 2040 Long Range Transportation Plan (Both Island-wide and five sub-plans); the current Construction Improvement Program (CIP) for FY 2014 through 2018; revenue and expenditure history; revenue and expenditure projections of the Authority, inflation and economic projections; and updated roadway and bridge inventory data. The information consisted of various reports, maps, computer printouts, and miscellaneous statistical data in both printed and electronic format. The assistance of the Office of Planning and Office of Economic and Statistical Studies in obtaining this information is greatly appreciated.

Analysis

The data gathered from the above sources has been compiled and summarized in tabular and graphic format to obtain a clearer picture of certain historical trends and projections. For example, projected and actual revenues have been plotted for the last 15 years and compared with the annual programs in order to assess the Authority's track record in forecasting revenues and expenditures and in turn, assess the probable accuracy of the five-year financial projections.

As new years are added to the present analysis, the oldest years are removed from the listing. Since this program has been carried out from 1986, one could look at past reports and trace the history of the CIP for the 28 years. Also, the current Five-year Construction Improvement Program is compared to the previous program in order to identify any changes in direction or dramatic revisions that might have an effect to on maintenance of the roadway and bridge network and rehabilitation of the existing functional systems.

Field Reviews

New additions to the CIP relative to maintenance and rehabilitation were identified and spot-checked in the field for reasonableness. Also, needed improvements observed in the field were checked against the Program to determine if they were, in fact being implemented or programmed. Most of these projects have to do with pavement rehabilitation, bridge deck repair, or major emergency repairs. In some cases, such as the reconstruction of PR-2 west of Ponce or the extension of PR-66 eastward the work is obvious, however other programs such as a sign repair/replacement effort may not always be as noticeable.

ISLAND – WIDE LONG TERM PLAN REVIEW

General

Beginning in 2012 and continuing in 2013, the Commonwealth developed a new long range plan. The 2040 Long Range Transportation Plan has been prepared by The Puerto Rico Metropolitan Planning Organization (MPO), through the Puerto Rico Department of Transportation and Public Works (DTPW) and the Puerto Rico Highway and Transportation Authority (PRHTA) for the two transportation management areas (TMAs) and five transportation planning regions (TPR) in Puerto Rico. This document presents the 2040 LRTP for the five TPRs: North, Southwest, South, Southeast, and East.

The Puerto Rico MPO is required by federal law to develop and update the LRTPs in cooperation with the respective agencies that are involved with the management and development of various transportation modes. It is updated or rewritten every five years. According to the Plan document, work started on the current version in 2009. Several drafts of the Plan were produces in 2013 and the final draft made available in October 2013. It replaces the previously approved 2031 and 2031 plans which were the basis for the review contained in the last Maintenance Evaluation and Program Review for 2011-2012. The plan covers two transportation management areas (TMA) and five transportation planning regions (TPR) in Puerto Rico. This document presents the 2040 LRTP for the five TPRs: North, Southwest, South, Southeast, and East. These sub-plans are basically specific parts of the Island Wide Plan that provide data for the specified local area and identify the needs of projects at the local level. These resultant highway plans and recommended programs serve as the basis for all long-range planning of highway and transportation facilities throughout the Commonwealth.

This new Plan retains several of the earlier overall objectives of the Government relative to transportation services while offering a more balanced and realistic approach to the development of the highway network because it is based on new demographics and factual data collected

during an extensive island-wide data collection and public hearing process carried out by the consultants who prepared the plan. Financial projections have been revisited and funding strategies revised to bring them into a realistic estimate for the near term (next five years). While the earlier financial projections were based on economic trends of 2000 through 2005 that have now been proven to be overly optimistic. The recession, beginning in 2005 for Puerto Rico changed most of the economic projections and metrics that planners depended on for estimating and allocation of funds and budgets. For example, the Plan originally forecast revenue projections for FY 2014 to be $2,800 million and FY 2015 to be $2,265 million. The current CIP forecasts revenue for the same to periods to be $2,622 million and $1,749 million respectively. This includes the proposed bond issues for FY 2014 and FY 2015. If these amounts are not realized the total financing will be considerably less and the Authority will need to go back to the GDB to acquire another loan to cover all its commitments.

With the economic downturn that began in 2015 and has continued through the current period, the Commonwealth has had to develop new strategies for dealing with a continuing limitation of funds and to begin efforts to revise their spending priorities. The Long Range Plan projects revenues from current sources for FY2014 to be $666.288 million while excluding Federal Aid. Unlike previous programs, the CIP matches the new Long Range Plan and, which is more conservative with regard to the revenue forecast. Looking at the overall five year program, the total dedicated revenues are estimated to be $3.550 billion through FY 2018. This forecast shows only moderate increases of one to two per cent per year over the period.

Comments

Based on a comparison with the Long-Range Plan, the current CIP continues to support the major decisions made during the planning process regarding development and improvement of the highway system. With this new plan and reworked CIP, the Authority has made a good attempt at being more realistic regarding both its available revenues and the expenditure of those revenues. The major objective of completing the "Island-wide Network" remains a high priority. Programs have been aimed at completion or improvement of the "perimeter" highways (i.e., PR-2, PR-3, PR-22 and PR-53) and major cross-island links (i.e., PR-10, PR-30 and PR-52). Also, major projects such as PR-2, PR-5, PR-17 and PR-66 have been completed or initiated in order to relieve congestion in the San Juan metropolitan area. PR-66 was opened to traffic in 2006 and was included in the inspection for the first time in 2007. Construction of the extension of PR-66 east to Rio Grande was initiated in 2009 and was completed in 2012. The work on the extension of PR-10 through Adjuntas is also progressing. Portions of PR-2 between Ponce and Yauco are currently almost complete with the exception on one overpass. This will provide provide an extension of the PR-52 toll road.

Other initiatives include the improvement in roads that support or lead to multimodal transportation systems. This includes new routes that feed the Tren Urbano. The Tren Urbano has now been in full operation along the first completed section of the network from Bayamon to Sagrado Corazon for eight years. Hopefully, this will reduce traffic congestion and provide better access to the San Juan Metropolitan Area by providing bus service from outlying areas to the Tren Urbano stations that will function as a transfer point for workers coming into the city. When completed, it will serve as the backbone of a multimodal transportation system for the area

and is the largest and most important infrastructure project for Puerto Rico since the initial development of the expressway system. Since plans have been stalled for some time to extend the Tren Urbano, the Authority has developed a system of Bus Rapid Transit programs to enhance the use of the Tren Urbano and therefore reduce congestion along various routes into San Juan. The first of the BTR's has been constructed in the PR-22 median from Toa Baja to the Bayamon Station and was put into operation in August 2013.

For the current Tren Urbano operation and maintenance, the FY2014 amount of $$69.570 million is authorized. This is approximately 30 percent less than the earlier CIP budgeted amount. The LRTP projects no increase in the annual budget for the next four years. A new five-year agreement has been negotiated with ATI that includes a reduction in the contract cost and still holds ACI accountable for operation and maintenance to the present standards. Financial penalties can be assessed for poor performance. With the new initiative to extend the rail system to Caguas, the Government has chosen a P3 strategy which will hopefully provide both the needed facility as well as a plan to operate and maintain it over a long term period.

The Commonwealth Government has passed several laws since 2009, adopting a privatization strategy for the operation and maintenance of large government infrastructure. This strategy was in jeopardy after the change in government, but a thoughtful review of the process by the new administration has resulted in moving forward with some projects while undergoing a more rigorous evaluation of the benefits of others. This has included the selection of high priority projects, including toll roads to be concessioned as well as the Caguas light rail mentioned above. With the close on the PR-22/PR-5 concession in September 2011, this starts the implementation period for the P3 program. Other possible programs within the highway area are the extension of PR-22 from Hatillo to Aguadillia and the concession of one other existing toll facility. In addition to the construction of these facilities, the concessionaire must meet specific maintenance and operation standards during the 40 year concession period and concessionaire's performance will be monitored using a set of specific standards for both condition and timely performance of maintenance and operational work.

CONSTRUCTION PROGRAM REVIEW

The Authority maintains a Five-Year Construction Improvement Program that is updated annually. The CIP includes a listing of projects by construction code and project class; a summary of financing by revenue source and year; and a listing of individual projects grouped by function and geographic location. The current program is organized by function and by route. Other categories such as Federal Aid (FTA) have been added to identify major program initiatives that federal money will be used for. Although some features of an individual project might have changed from one year to the next, matches between the previous program and the current program can be verified through the AC construction code for each project.

General Approach

The general approach by the Authority continues to be to direct the greatest effort toward the improvement of the Urban and Island-wide System, while taking care of the most essential needs on the Secondary and Tertiary roads serving the inner portion of the island. The Authority

also states that reconstruction and improvement of existing roads is also a priority. This approach is similar to last year with the addition of several safety programs linked to Federal government funding. These include improvements to roadside barriers (guardrails) and other safety items such as striping (in school zones) and improved signing and traffic signals. This policy is reflected in the higher condition ratings observed on the Expressways and Primary roads. This continues to be the case although recent efforts have shifted some additional resources to the Tertiary Roads. Also, the Bridge Program has been revised to use the maximum authorized money. The new CIP continues to have a reduced number of projects that focus on higher priority projects in the areas of construction, reconstruction and rehabilitation instead of special projects and smaller low priority efforts. According to the CIP, Project priorities are based on the following factors:

- Increase in transportation facilities capacity,
- Condition and level of service of existing facilities,
- Inclusion in the Master Plan,
- Reduced congestion in small metro areas by constructing bypasses,
- New and improved access to industrial parks, ports, airports, and other points of agricultural, tourism and commercial activities,
- Traffic engineering analysis and projections,
- Coordination of services between modes of travel (e.g. car to bus to Tren Urbano)
- Availability of funds,
- Coordination with federal agencies, and
- Public interest.

The CIP for FY 2014 to FY 2018 consists of a total of $1,714 million for design, right-of-way, construction and special projects. Construction totals $1,449 million. Design work is estimated to be $102 million and right-of-way acquisition $166 million over the five years. The overall program has been increased by approximately $190 million since FY 2011. This includes an increase in construction of $424 for construction, $2 million for design and a decrease of $4 million for ROW. This increases many of the reductions that were programmed in the previous CIP.

Figure 3-1a shows the total program, by investment categories while Figure 3-1b shows projected funds and sources for financing the program. Excluding financing and debt service, the program consists of $3.188 billion, including $340 million for transit and Tren Urbano projects and operations. The total amount is $ 255 more than the previous five year program (FY 2010 – FY2014); an increase of 8.6% above the previous program, which is a much more modest increase that from the previous program estimates. The amount of revenue from traditional revenue sources, such as taxes on motor fuel and oil, vehicle licensing fees and toll revenues accounts for approximately 71 percent of the total funding for the current five-year program. The remaining revenues are from Federal aid, bond revenue, and other investment sources. A look at the previous four years shows the ratio to be around between 60 to 65 per cent except for the 2010-2014 programs where the estimated revenues were 42% above expenditures.

The estimated amount of revenue from 1968 and 1998 Resolution revenues for the FY2012 CIP was $2.852 billion while the FY2014 CIP showed an estimate of $3.549 billion over the five years. This is a 20 percent on the revenue side for the full five years. This is due to projected increases in licenses fees and additional POL taxes. With remaining revenues coming from the federal government this amount has been estimated to remain about the same. The overall decrease in the 2014 CIP comes from financing and borrowing on credit lines which shows a total decrease of $4,653 billion to $1.263 billion, which is a decrease of 80% from the previous plan. It is thought that the Commonwealth is sincerely looking at getting its financial house in order and that proposing a plan that assumes future borrowing as a strategy will not be allowed. However, the use of bonding is being allowed and this may be an only option available for providing sufficient funding for Authority programs. Unfortunately bonding also carries long term risks and the possibility of losing future credit availability

Revisions to the CIP

The Authority updates the Five-Year Program on an annual basis using the previous program as a starting point. Completed projects are deleted from the program, new projects are added, and some existing projects are modified or eliminated depending on priority, feasibility and/or available funding.

A comparison is made of all projects in the current CIP with those in the previous years' program. The results of this comparison are summarized in Figure 3-2. The current CIP has a total of over 428 projects. The previous CIP showed approximately 500 projects, however 164 of these were unfunded. Therefore, the number of projects in the new CIP (FY 2014 – 2018) is actually higher. The current plan contains a total of 226 unchanged projects and 202 new projects. The number of new projects is double that of the previous plan, excluding the unfunded project. From the previous years' plan, 205 projects were completed and 87 were deleted. An analysis of all projects contained in both plans shows that a number of projects dealing with special activities and smaller projects were eliminated in favor of reprogramming the funds to cover budget increases in already existing construction, reconstruction and rehabilitation efforts.

This year the number of completed projects was extensively more than the previous year by about 98 percent, which shows that the Authority is trying to close out projects in an effective manner. There were 202 new projects identified in the CIP. A number of these projects were the safety initiatives mentioned earlier. These projects are currently only listed on a geographic area basis; other projects focus on pavement restoration, bridge deck replacement and completion of the landslide repairs necessitated by the tropical storms of several years ago. Other initiatives worth noting are the Strategic Island-Wide Network (17 projects); reconstruction and repaving (18 projects); and bridge repair/replacement (27 projects). From these data it is reasonable to believe the recommendations in the Long-Range Plan are being followed. The basic problem continues to be having requirements for repair and reconstruction that are outstripping the available funds.

FUNDING PROJECTIONS

The Authority tracks historical funding levels and expenditures and prepares funding and expenditure projections for the period corresponding to the Five-Year Program. Figure 3-3 shows the history of planned versus actual funding and expenditures for the last 18 years and the current projections for the current and next four years, including any anticipated funds from bond issues.

Figure 3-4 is a graphical comparison of estimated and actual funding amounts listed in Figure 3-3 for the periods indicated. From the table in Figure 3-3 and the chart in Figure 3-4 it can be seen that actual funding levels have met or exceeded the projected funding level except for the FY 2008 to FY2013 time period. There were only two previous years where projected funding was not accomplished. They were in 1993, 2005. The largest of these was 2008 with a difference of negative $447 million, or approximately one-sixth of the earlier projection. This was due mainly to the downturn of the economy with the reduction in resolution revenues and the postponement of the new bond issue. During the period 2008 to 2013, the Authorities estimated resolution revenues showed a great fluctuation as the government struggled to address the debt issue using a number of different strategies. A bond issue was again dropped because of the perceived high interest rate requirement. During the period 2005 to 2009, the Authority's resolution revenues increased at a compound annual rate of approximately 1.8% due mainly to the growth of toll receipts. Toll receipts grew by 50.4% between 2005 and 2007, but began decreasing in 2008 and 2009 due to the economic downturn. As a result, toll revenues were down by 6.2% in 2009 from the previous high in 2007. In 2010 toll revenues increased approximately 3% to an estimated $194.9. It also should be noted that toll revenues from PR-22 and PR-5 were lost beginning in 2011 due to the concession and the monies gained from the sale of the concession did not directly go toward financing the Authority's operations and maintenance programs.

Figure 3-5 shows a similar comparison of projected versus actual expenditures for the same period. With year-end balances excluded, projected expenditures generally follow the projected funding shown in the previous figure with the exception of FY2010, 2012 and 2013. There have been nine years previously where actual expenditures exceeded project expenditures. Most years, with the exception of 2003, have been less than three percent. In all years except 2002, the actual revenue exceeded the actual funding. For both revenues and the expenditures, the Authority's forecasts, with the exceptions of 2003, 2008 and beginning in 2010 to 2013 have been relatively accurate over the long term. Because actual revenues were so limited, expenditures were also limited to a comparative amount so as to not encourage continued debt financing. This is a prudent thing to do during an economic downturn. To get the needed funding to continue effective maintenance the government has had to look elsewhere, which is what they have done with implementing the concession program.

Traditionally, most non-bond funding sources such as fuel and oil taxes, tolls and registration fees have been projected with slight increases (approximately 3 percent per year). For many years this assumption was fairly safe as the economy grew. This was consistent with practices in many other state transportation departments. However due to the economic downturn that actually began for Puerto Rico in 2005 the Authority has been forced to reduce their

projections for the current five-year period to approximately 1.5 percent per year. Therefore, the overall financing plan shows a decrease from the previous year's estimates. While the plan shows the possibility of projected bond funds for the years 2014 and 2015, this is unlikely as the Commonwealth's bond ratings at present are highly unfavorable.

There is no doubt that the Puerto Rican economy is currently experiencing problems. The Planning Board's revision to the FY2008 projections showed that growth would actually contract by 2.5 % with another contraction of 3.4 % in FY2009 and another 3.6 % in 2010. This means that over the past 10 years, the economy will not have grown, but will have contracted about 11 percent during the last four years. The Government is running at a deficit of approximately more than $3.5 billion with revenue expected to continue to decline over the short term. As of November 2013, the Authority had over $1 billion in debt, of which $959 million were debts from bonds, credit lines and other operational debt.

In January 2009, the Government began to implement a multi-year plan designed to achieve fiscal balance, restore sustainable economic growth and safeguard the investment-grade ratings of the Commonwealth. The fiscal stabilization plan, which was generally contained in Act No. 7 of March 9, 2009, as amended (Act No. 7), planned to achieve budgetary balance on or before fiscal year 2013, while addressing expected fiscal deficits in the intervening years through the implementation of a number of initiatives, including: (1) a gradual $2 billion operating expense-reduction plan through reduction of operating expenses, including payroll, which is the main component of government expenditures, and the reorganization of the Executive Branch; (2) a combination of temporary and permanent revenue raising measures, coupled with additional tax enforcement measures; and (3) a bond issuance program through COFINA. The proceeds from the COFINA bond issuance program are being used to repay existing government debt (including debts with GDB), finance operating expenses for fiscal years 2009 through 2011 (and for fiscal year 2012, to the extent included in the government's annual budget for such fiscal year), including costs related to the implementation of a workforce reduction plan, and fund an economic stimulus plan. This has not worked due to the fact that the economic forecasts were too optimistic and the bonding climate for Puerto Rico became very risky. As a result, the Commonwealth was left with very few options and a mounting debt requirement for such issues as health care and pension obligations.

While there may be some relief with the Federal Government's Stimulus packages and the new administrations revised economic recovery plan, not much can be done on a long term basis to expand maintenance operations except to convince policy decision makers that appropriation of additional funds from the general fund for maintenance of the non-toll road network is needed and should be a priority over any new infrastructure initiatives. Also diverting existing funds from future construction programs may be another approach to increased maintenance funding. This may be a good approach when considering all options. It may be better to maintain what is already built in good condition than to build additional infrastructure and have a maintenance budget that can not meet the requirements of both the old and new assets to an acceptable level. Also, at some point the road network covering the island will be to a point where no more roads or links will be needed. That is to say the saturation point of usable land for roads has been reached. As a result, all funds provided to transportation would be for rehabilitation, repair and routine maintenance to the existing system.

Figure 3-1a
FIVE-YEAR CONSTRUCTION IMPROVEMENT PROGRAM
Fiscal Year 2014 – 2018

	PROGRAM	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	TOTAL 2014-2018
28	RIGHT OF WAY	42,315,260	30,000,000	30,000,000	30,000,000	30,000,000	162,315,260
29	DESIGN	22,088,454	20,000,000	20,000,000	20,000,000	20,000,000	102,088,454
30	CONSTRUCTION LOCAL	164,901,352	117,718,265	107,265,979	111,945,515	86,059,155	587,890,266
31	CONSTRUCTION FEDERAL (FHWA & EARMARKED)	224,944,054	202,584,203	163,146,513	158,805,205	112,236,622	861,716,597
32	**SUB-TOTAL HIGHWAY & CONSTRUCTION PROGRAM**	**454,249,120**	**370,302,468**	**320,412,492**	**320,750,720**	**248,295,777**	**1,714,010,577**
33	SALARIES AND FRINGE BENEFITS, OTHERS EXPENSES	21,956,073	22,251,386	22,867,303	22,718,504	22,830,807	112,624,073
34	SALARIES AND FRINGE BENEFITS, OTHERS (capitalized)	82,171,747	84,350,413	87,190,466	90,068,241	90,646,506	434,427,373
35	LEGAL CLAIMS - PAYMENT PLANS	15,576,455	13,689,123	10,240,728	4,923,599	1,582,548	46,012,453
36	OTHER OPERATIONAL EXPENSES (including capitalized expenses)	40,889,106	41,675,502	41,725,502	41,725,503	41,725,501	207,741,114
37	RESERVE FOR OPERATIONAL CONTINGENCIES	5,000,000	4,000,000	3,000,000	3,000,000	3,000,000	18,000,000
38	**TOTAL PROGRAM & OPERATING EXPENSES**	**619,842,501**	**536,268,892**	**485,436,491**	**483,186,567**	**408,081,139**	**2,532,815,590**
39	TOLL FACILITIES OPERATION AND MAINTENANCE	19,262,372	19,430,838	19,455,839	19,455,838	19,455,839	97,060,726
40	ELECTRONIC TOLL COLLECTIONS	43,000,000	43,500,000	44,000,000	44,000,000	44,000,000	218,500,000
41	ATI (TREN URBANO/FIRST TRANSIT/METROURBANO/TU CONEXION)	69,570,985	67,270,985	67,910,021	67,910,021	67,910,021	340,572,033
42	**TOTAL OPERATIONAL COSTS**	**131,833,357**	**130,201,823**	**131,365,860**	**131,365,859**	**131,365,860**	**656,132,759**
43	**TOTAL PROGRAM & RELATED EXPENDITURES**	**751,675,858**	**666,470,715**	**616,802,351**	**614,552,426**	**539,446,999**	**3,188,948,349**
44	EXISTING DEBT SERVICE (Principal)	107,600,000	98,950,128	102,925,845	107,286,308	111,921,000	528,683,281
45	EXISTING DEBT SERVICE INCLUDED SWAPS (Interest)	239,589,000	248,232,872	244,520,747	240,159,124	235,235,265	1,207,737,008
46	NEW RESOLUTION DEBIT SERVICE	24,500,000	118,250,000	138,500,000	138,500,000	138,500,000	558,250,000
47	**TOTAL BOND DEBT SERVICE**	**371,689,000**	**465,433,000**	**485,946,592**	**485,945,432**	**485,656,265**	**2,294,670,289**
48	INTEREST GDB LINES OF CREDIT	99,000,000	18,000,000	-	-	-	117,000,000
49	**TOTAL DEBT SERVICE**	**470,689,000**	**483,433,000**	**485,946,592**	**485,945,432**	**485,656,265**	**2,411,670,289**
50	REPAY GDB LINES OF CREDIT	1,400,000,000	600,000,000	-	-	-	2,000,000,000
51	**TOTAL FINANCING EXPENDITURES**	**1,870,689,000**	**1,083,433,000**	**485,946,592**	**485,945,432**	**485,656,265**	4,411,670,289
52	**GRAND TOTAL**	**2,622,364,858**	**1,749,903,715**	**1,102,748,943**	**1,100,497,858**	**1,025,103,264**	**7,600,618,638**

Figure 3-1b
FINANCING RESOURCES FOR FIVE-YEAR PROGRAM
Fiscal Years 2014 – 2018

	FINANCING	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	TOTAL 2014-2018
1	GASOLINE TAX REVENUE	157,490,000	160,350,000	161,940,000	161,950,000	161,760,000	803,490,000
2	DIESEL OIL TAXES	7,500,000	7,500,000	7,500,000	7,500,000	7,500,000	37,500,000
3	MOTOR VEHICLE LICENSE FEES	90,300,000	95,500,000	95,500,000	95,500,000	95,500,000	472,300,000
4	TOLL REVENUES	98,420,000	99,650,000	100,180,000	100,800,000	101,450,000	500,500,000
5	INVESTMENT INCOME 68 RESOLUTION	2,639,621	2,766,106	3,076,832	3,619,766	3,619,766	15,722,091
6	**TOTAL PLEDGE REVENUES (RES 1968)**	**356,349,621**	**365,766,106**	**368,196,832**	**369,369,766**	**369,829,766**	**1,829,512,091**
7	PETROLEUM TAX REVENUE	247,600,000	273,700,000	276,700,000	276,700,000	313,430,000	1,388,130,000
8	CORREDOR DEL ESTE REVENUE	30,070,000	31,460,000	32,450,000	33,400,000	34,370,000	161,750,000
9	INVESTMENT INCOME 98 RESOLUTION (includes (SIB)	12,249,225	12,713,514	13,853,726	15,846,101	15,846,101	70,508,667
10	**TOTAL PLEDGE REVENUES - RES. 1998**	**289,919,225**	**317,873,514**	**323,003,726**	**325,946,101**	**363,646,101**	**1,620,388,667**
11	**SUBTOTAL PLEDGE REVENUES**	**646,268,846**	**683,639,620**	**691,200,558**	**695,315,867**	**733,475,867**	**3,449,900,758**
12	CIGARETTE TAXES (LEY #30)	20,000,000	20,000,000	20,000,000	20,000,000	20,000,000	100,000,000
13	**TOTAL REVENUES**	**666,268,846**	**703,639,620**	**711,200,558**	**715,315,867**	**753,475,867**	**3,549,900,758**
14	FEDERAL AID - FHWA & EARMARKED PROJECTS	179,955,243	162,067,363	130,517,210	127,044,164	89,789,297	689,373,277
15	FEDERAL AID - FTA (SEC. 5307 & SEC. 5309)	19,066,255	19,066,255	19,066,255	19,066,255	19,066,255	95,331,275
16	**TOTAL FEDERAL FUNDS**	**199,021,498**	**181,133,618**	**149,583,465**	**146,110,419**	**108,855,552**	**784,704,552**
17	LOCAL APPROPRIATIONS	12,085,714			-	-	12,085,714
18	**TOTAL FEDERAL AND LOCAL FUNDS**	**211,107,212**	**181,133,618**	**149,583,465**	**146,110,419**	**108,855,552**	**796,790,266**
19	TRANSIT REVENUES (T.U., First Transit, MetroUrbano, TuConexcion)	9,476,990	9,829,606	10,214,770	10,635,068	10,039,109	50,195,543
20	ELECTRONIC TOLL FINES	10,800,000	10,800,000	10,800,000	10,800,000	10,800,000	54,000,000
21	IMPACT FEES & OTHER INCOME	12,505,111	11,865,764	11,443,419	11,236,675	11,762,742	58,813,711
22	**TOTAL OTHER INCOMES**	**32,782,101**	**32,495,370**	**32,458,189**	**32,671,743**	**32,601,851**	**163,009,254**
23	**TOTAL RESOURCES**	**910,158,159**	**917,268,608**	**893,242,212**	**894,098,029**	**894,933,270**	**4,509,700,278**
24	BOND ISSUES	1,400,000,000	600,000,000	-	-	-	2,000,000,000
25	FINANCING FED. CONST. PROJECTS - 20% Matching	44,988,811	40,516,841	32,629,303	31,761,041	22,447,324	172,343,320
26	**FINANCING**	267,217,888	192,118,267	176,877,428	174,638,787	107,722,670	918,575,040
27	**GRAND TOTAL**	**2,622,364,858**	**1,749,903,716**	**1,102,748,943**	**1,100,497,857**	**1,025,103,264**	**7,600,618,638**

Figure 3-2

FY 2014 – 2018 PROGRAM COMPARED TO PREVIOUS PROGRAM

Project Status	Number of Projects by Program Type						
	Primary	Secondary	Tertiary	Toll	Train & Transit	Other	Total
Unchanged	66	30	43	14	9	64	226
New	47	50	45	10	2	48	202
Total	111	79	86	24	11	112	428
Completed 12/	62	44	49	9	2	40	205
Deleted 13/	19	19	10	1	1	27	87

12/ A project was categorized as "Completed" if it was in the construction stage in the previous program and did Not appear in the current program.

13/ A project was categorized as "Deleted" if it was not yet in the construction stage in the previous program and Not appear in the current program.

Figure 3-3
PUERTO RICO HIGHWAY AND TRANSPORTATION AUTHORITY
SUMMARY OF FUNDING AND EXPENDITURES 15/ 16/

Fiscal Year	Funding ($ millions)		Expenditures ($ millions)	
	Actual	Projected	Actual	Projected
1996	1,354.614	708.640	731.231	708.640
1997	1,075.131	975.189	927.350	975.189
1998	1,839.984	1,186.293	1,343.405	1,186.293
1999	1,545.608	1,295.497	1,499.435	1,295.497
2000	1,739.250	1,357.703	1,283.114	1,357.703
2001	1,377.056	1,185.783	1,349.061	1,185.783
2002	1,530.414	1,161.810	1,538.230	1,161.810
2003	2,431.057	1,398.325	2,220.276	1,398.325
2004	1,432.885	1,222.102	1,350.250	1,222.102
2005	1,082.922	1,181.369	1,033.698	1,181.369
2006	1,352.718	1,204.880	1,298.859	1,204.880
2007	1,603.691	1,298.585	1,575.926	1,275.026
2008	1,128.632	1,575.916	992.300	1,575.916
2009	1,079.173	934.202	1,002.000	934.202
2010	1,030.607	1,764.364	1,089.800	1,764.364
2011	1,009.994	1,056.337	1,090.000	1,056.337
2012	2,275.279	2,119.284	882.900	2,119.284
2013	1,374.824	1,656.974	1,374.824	1,656.974
2014		2,622.369		2,622.369
2015		1,749.904		1,749.904
2016		1,102.749		1,102.749
2017		1,100.498		1,100.498
2018		1,025.103		1,025.103

14/ Including $197.9 million Interim Finance.
15/ Initial balance of $200.15 million included (Bond issue of $611.77 million in June 1992).
16/ Including remaining $437.13 million of 1996 Bond issue.
17/ Includes new bond issue of approximately $298 million and $105 million in ARRA funding.

Figure 3-4

ACTUAL AND PROJECTED FINANCING

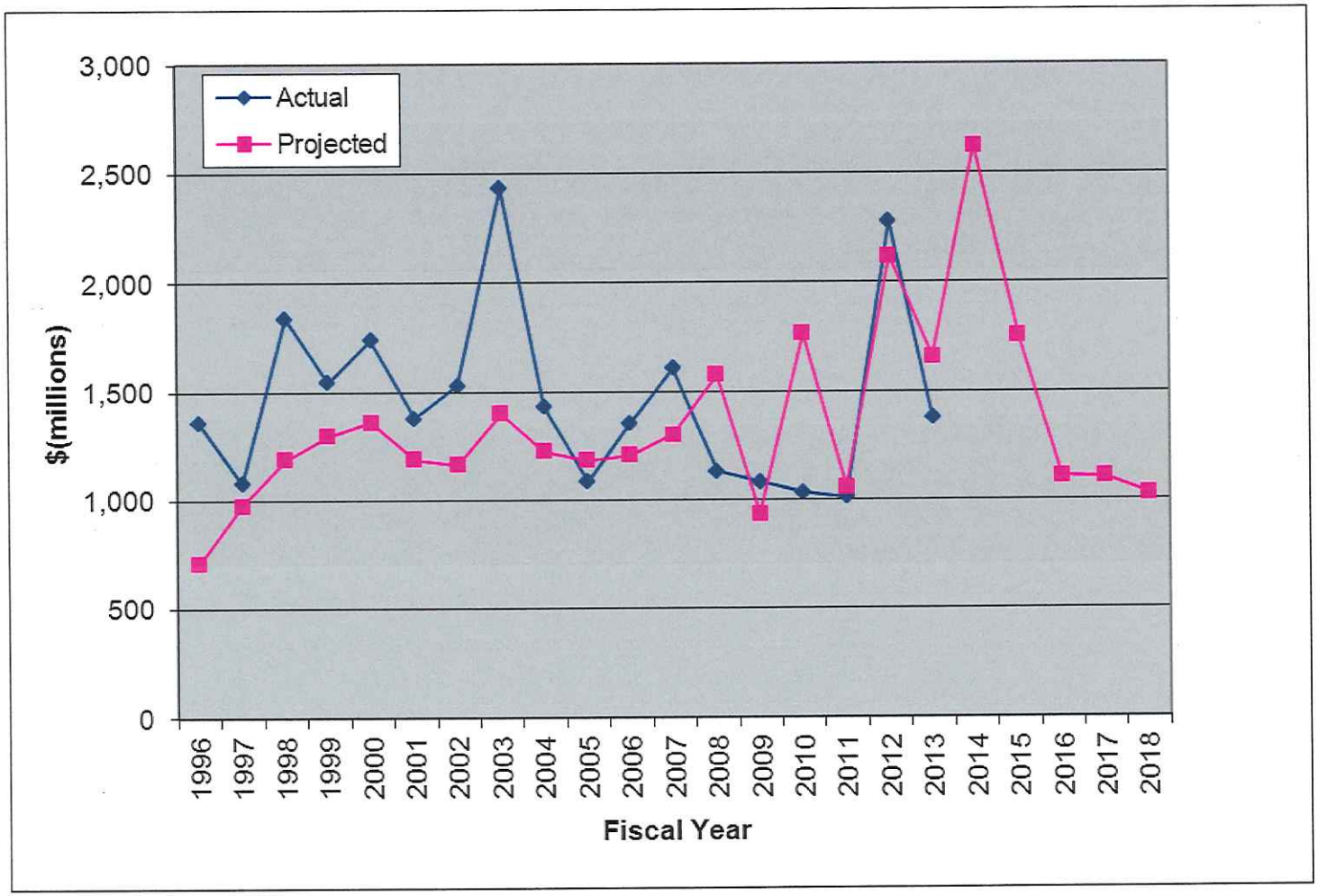
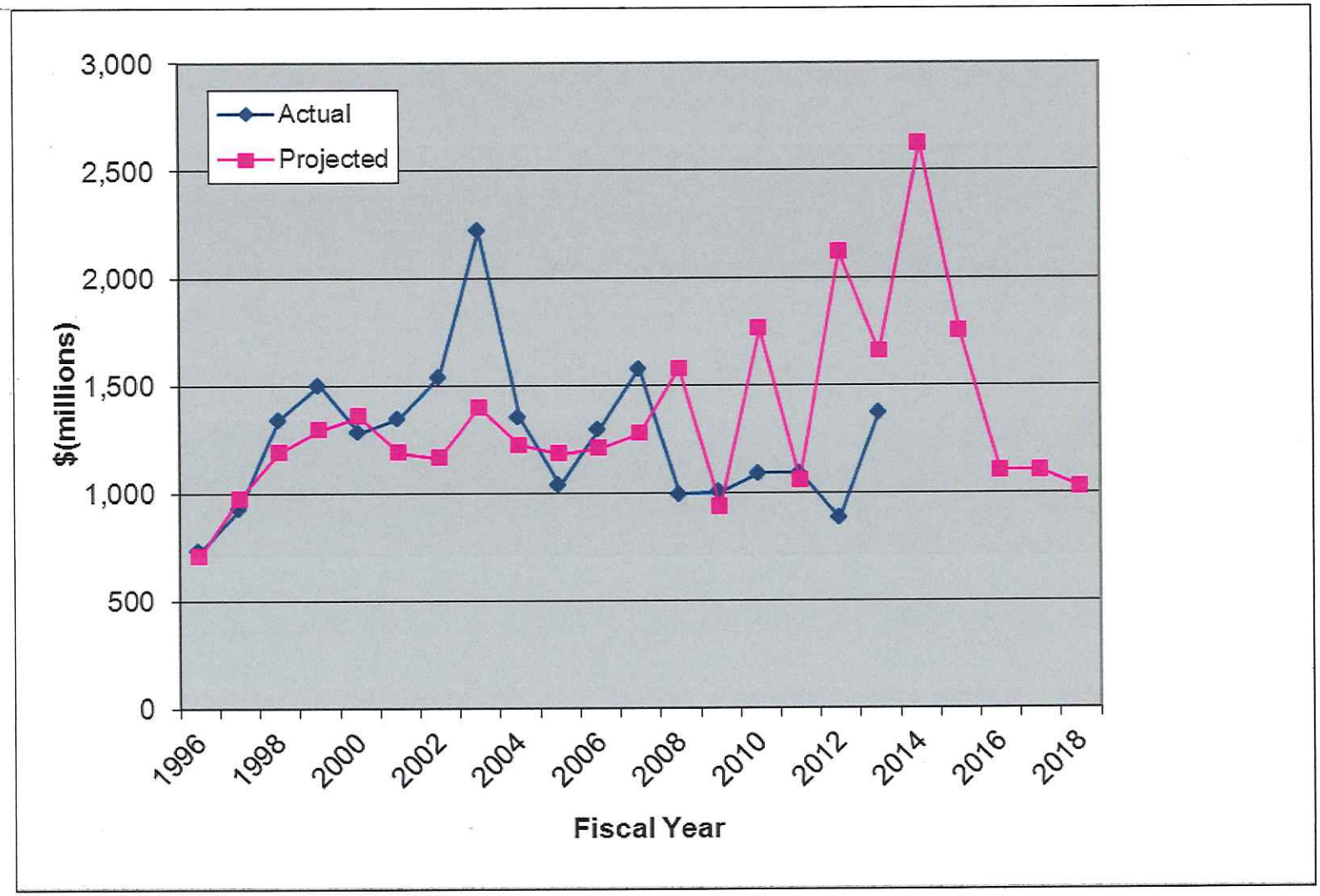


Figure 3-5

ACTUAL AND PROJECTED EXPENDITURES



RECOMMENDATIONS

Based on the review of the currently available Long Term Transportation Plan (2040) and the current Construction Improvement Program (FY2014-FY2018) it is recommended that the Authority include the following programs in the CIP and initiate the noted activities in order to improve the condition of specific assets of the transportation facilities under the Authority's care. Most of these recommendations are similar to those made during the last maintenance review. The CIP should focus two major activities;

1. completing the high priorities defined in the Long Term Plan; and
2. rehabilitation and reconstruction of those sections of roadway and bridges that cannot be maintained to a satisfactory level using routine maintenance applications.

This may mean modifying or reprioritizing some construction projects that are of a high visibility and politically sensitive nature, however, building more infrastructure without the dedicated funds to maintain them would only lead to additional problems with the new facilities and cause acceleration of deterioration of older facilities.

The following are the recommendations for expending the maintenance funds once a stable and sufficient budget has been obtained. Many of these recommendations are the same or similar to previous recommendations however they remain relevant because they have not been adequately addressed. While the Authority has developed and initiated programs that address some of the previous recommendations, there is still a need to focus on remaining requirements as well as boost the funding for the initiatives underway.

- With the use of the ARRA funding, the Authority began addressing the need to **initiate a pavement repair and rehabilitation program.** The program now is turning to identification of specific areas in need of rehabilitation. The CIP does identify specific projects in many cases and also identifies general geographic areas where micro pavement rehabilitation programs will be applied. It is not clear whether a pavement assessment has been carried out by the Authority. If not, an internal review should be carried out by the regional administration to prioritize the locations to be improved. Based on the condition assessment on a regional basis, available funds should be allocated to take care of the most pressing needs immediately. The remaining projects will stay on the priority list and used to support requests for additional funding through the annual general budget process. Also, additional funds may be available from the federal government based on the need to make safety improvements in some locations.

- During the past four years the Consultant has noted that some **bridge decks** have been repaired. Redecking projects were also performed as part of the ARRA program. This is a good start for eliminating these problems that exist is a number of different locations around the island. Based on the Consultants most recent evaluation, new areas of distress have been observed. It would appear that the main cause of the deck problems on the non-toll roads is due to the original construction practice on not

placing the reinforcing steel within the deck at the correct height (either too high or too low). The CIP needs to elevate the amount of funding to address all of the remaining deck failures within the next three years.

- **Landslides and collapsed ditches** remain untreated in several areas of non-toll roads, especially in the west central and south east portions of the island. While the CIP has included projects to repair the major areas that have existed for several years, there are still other unstable areas that need repair or ditch cleaning to reduce the problems of washouts, landslides, or undermining of the roadway. One such high visibility area was on PR-22 at km 6.2 during December 2013. Additional funds should be focused on these specific areas identified by a good geotechnical review of problem areas.

- The number of **bridge deck joints and deck drainage** in poor condition continues to be a pervasive problem. The overall ratings for these two characteristics are the lowest of all characteristics. Deck Joints scored a 47.06 Good rating this year, which was up from the previous year. However, the overall Good rating should be above 70 in order to indicate adequate maintenance of this characteristic. Deck drains rating of 58.1 Good is better than previous years however, as with the Deck Joints efforts should be initiated to improve this rating to above 70. This could easily be done by developing a local community program that would take care of this maintenance activity. Since these local communities paint the bridges, they should be encouraged to periodically clean them also.

- The CIP includes several projects for repair of **bridge abutments and scouring** around piers. There are additional locations that need repair or rehabilitation. No doubt the biannual NBIS inspection has identified all bridges needing repair. This should be a high priority program in order to ensure structural integrity of each bridge and minimize the risk of having to close the bridge due to unsafe traffic loading.

- **The effort to identify and program improvements to striping, especially in rural areas on the Secondary and Tertiary systems needs to continue until all ratings for this characteristic are above the 70% Good level.** Currently the Tertiary Road network has an overall Good rating of 67.7%, with is up three points from the previous year, but still not at the 70 % level. Lane striping and edge marking, particularly in rural and hilly areas is especially hard to see at night and during rains due to faded and missing lines. Lane striping on bridge decks should be another focused program due to the problem of not sticking to the concrete surface. It is noted that the current CIP includes several striping programs for areas around schools.

- **Additional emphasis needs be placed on sign repair and replacement programs, particularly for Primary and Secondary Roads.** The current overall rating for signs has now gone below 90% and shows a continued downward trend. While the overall Good condition rating is still at a decent 88.8 %, the continued slippage could result in more accidents as well as more congestion. Missing or damaged stop signs and route markings are the biggest problem along with graffiti in general and on toll road

signs in particular. These are safety problems that may qualify for additional federal funding or grant programs.

- With continued **projected decline in some traditional revenues and no growth in others** (resolution revenues and tolls) that help fund construction and maintenance programs, the Authority needs to find new or additional sources of revenue to meet the maintenance needs of the currently aging system as well as new facilities that are being completed. This may mean using construction funds for maintenance and rehabilitation efforts. The availability of concession funds is a short term solution however, the government should resist the temptation of spending these funds outright and should consider using some of the money to pay down the current bond debt and invest the rest in stable growth accounts that will provide additional funds over the long term. Alternately, methods to reduce the cost of operation and maintenance could also be pursued. This could include increasing of specific taxes; outsourcing of the maintenance function; and privatization of the Toll Roads.

APPENDIX

CONDITION RATINGS BY REGION AND ROAD CLASS

FOR

FISCAL YEAR 2014 - 2015

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 1-San Juan

Primary Roads - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	57.90	87.61	8.10	4.29
Pavement Structure	57.90	91.68	6.54	1.78
Shoulders / Curbs	57.90	91.63	6.70	1.67
Ditches / Drains	57.90	86.19	9.44	4.37
Slopes	4.30	93.72	4.19	2.09
Vegetation Control	57.90	93.42	5.09	1.49
Culverts	45.40	90.99	6.44	2.57
Bridges	Each			
Approaches	3.00	96.67	3.33	0.00
Deck	3.00	76.67	16.67	6.67
Deck Joints	3.00	16.67	33.33	50.00
Sub-Structures	3.00	83.33	0.00	16.67
Piers	3.00	93.33	6.67	0.00
Abutments	3.00	100.00	0.00	0.00
Drainage	3.00	55.00	26.67	18.33
Parapets / Rails	3.00	93.33	3.33	3.33
Super Structure	2.00	100.00	0.00	0.00
Painting	1.00	100.00	0.00	0.00
Water Way	1.00	100.00	0.00	0.00
Traffic Operations	km			
Signs / Reflectors	57.90	89.54	7.67	3.19
Guardrails / Barriers	57.90	83.32	11.19	5.48
Pavement Markings	57.90	83.33	9.40	7.26
Signals	49.20	99.32	0.38	0.30
Overhead Signs	28.40	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 1-San Juan

Secondary Roads - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	50.40	90.54	7.03	2.43
Pavement Structure	50.40	93.09	6.31	0.61
Shoulders / Curbs	50.40	97.24	2.76	0.00
Ditches / Drains	50.40	83.52	8.58	7.90
Slopes	29.70	98.97	1.03	0.00
Vegetation Control	50.40	92.69	5.85	1.46
Culverts	50.40	93.83	3.17	3.00
Bridges	Each			
Approaches	6.00	95.00	3.33	1.67
Deck	6.00	92.50	6.67	0.83
Deck Joints	5.00	54.00	23.00	23.00
Sub-Structures	6.00	99.17	0.00	0.83
Piers	6.00	96.67	0.00	3.33
Abutments	6.00	97.50	2.50	0.00
Drainage	6.00	65.00	19.17	15.83
Parapets / Rails	6.00	95.83	1.67	2.50
Super Structure	3.00	100.00	0.00	0.00
Painting	1.00	100.00	0.00	0.00
Water Way	5.00	100.00	0.00	0.00
Traffic Operations	km			
Signs / Reflectors	50.40	90.44	6.94	2.62
Guardrails / Barriers	47.80	85.39	8.29	6.32
Pavement Markings	50.40	79.76	11.94	8.29
Signals	43.40	99.59	0.41	0.00
Overhead Signs	9.40	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 1-San Juan

Tertiary Roads - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	9.00	95.00	5.00	0.00
Pavement Structure	9.00	95.00	5.00	0.00
Shoulders / Curbs	9.00	85.11	14.89	0.00
Ditches / Drains	9.00	85.11	3.72	11.17
Slopes	6.70	90.00	10.00	0.00
Vegetation Control	9.00	92.56	7.44	0.00
Culverts	9.00	92.56	7.44	0.00
Bridges	Each			
Approaches	4.00	83.75	10.00	6.25
Deck	4.00	92.50	6.25	1.25
Deck Joints	4.00	57.50	30.00	12.50
Sub-Structures	4.00	100.00	0.00	0.00
Abutments	4.00	97.50	2.50	0.00
Drainage	4.00	50.00	20.00	30.00
Parapets / Rails	4.00	98.75	1.25	0.00
Super Structure	2.00	95.00	5.00	0.00
Water Way	4.00	93.75	5.00	1.25
Traffic Operations	km			
Signs / Reflectors	9.00	90.00	5.00	5.00
Guardrails / Barriers	9.00	88.83	7.44	3.72
Pavement Markings	9.00	79.78	8.83	11.39
Signals	9.00	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 1-San Juan

Expressways (Toll Roads) - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	54.40	90.01	6.28	3.71
Pavement Structure	54.40	93.68	6.32	0.00
Shoulders / Curbs	54.40	94.21	5.79	0.00
Ditches / Drains	54.40	95.42	4.29	0.28
Slopes	34.20	94.33	4.25	1.42
Vegetation Control	54.40	96.16	3.27	0.57
Culverts	54.40	97.59	2.12	0.28
Bridges	Each			
Approaches	4.00	81.25	11.25	7.50
Deck	4.00	95.00	3.75	1.25
Deck Joints	4.00	43.75	3.75	52.50
Sub-Structures	4.00	100.00	0.00	0.00
Piers	2.00	100.00	0.00	0.00
Abutments	4.00	91.25	5.00	3.75
Drainage	4.00	91.25	6.25	2.50
Parapets / Rails	4.00	100.00	0.00	0.00
Super Structure	3.00	100.00	0.00	0.00
Painting	1.00	100.00	0.00	0.00
Water-Way	2.00	100.00	0.00	0.00
Traffic Operations	km			
Signs / Reflectors	54.40	91.37	6.64	1.99
Guardrails / Barriers	54.40	88.50	7.35	4.15
Pavement Markings	54.40	85.29	8.06	6.65
Signals	4.00	100.00	0.00	0.00
Overhead Signs	48.60	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 1-San Juan

ALL ROADS - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	171.70	89.61	7.07	3.33
Pavement Structure	171.70	92.90	6.32	0.78
Shoulders / Curbs	171.70	93.75	5.68	0.56
Ditches / Drains	171.70	88.28	7.26	4.47
Slopes	74.90	95.75	3.48	0.77
Vegetation Control	171.70	94.03	4.86	1.11
Culverts	159.20	94.23	3.99	1.78
Bridges	km			
Approaches	17.00	89.41	6.76	3.82
Deck	17.00	90.29	7.65	2.06
Deck Joints	16.00	45.31	21.88	32.81
Sub-Structures	17.00	96.76	0.00	3.24
Piers	11.00	96.36	1.82	1.82
Abutments	17.00	96.47	2.65	0.88
Drainage	17.00	65.88	17.65	16.47
Parapets / Rails	17.00	97.06	1.47	1.47
Super Structure	10.00	99.00	1.00	0.00
Painting	3.00	100.00	0.00	0.00
Water Way	12.00	97.92	1.67	0.42
Traffic Operations	km			
Signs / Reflectors	171.70	90.41	6.99	2.74
Guardrails / Barriers	169.10	85.87	8.94	5.20
Pavement Markings	171.70	82.72	9.69	7.59
Signals	105.60	99.51	0.35	0.14
Overhead Signs	86.40	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 2-Arecibo

Primary Roads - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	70.10	85.95	11.47	2.58
Pavement Structure	70.10	88.68	8.87	2.45
Shoulders / Curbs	70.10	89.53	5.62	4.85
Ditches / Drains	70.10	84.89	9.59	5.51
Slopes	52.00	93.93	2.78	3.29
Vegetation Control	70.10	90.88	6.85	2.26
Culverts	64.10	94.97	4.63	0.41
Bridges	Each			
Approaches	3.00	95.00	5.00	0.00
Deck	3.00	90.00	6.67	3.33
Deck Joints	3.00	65.00	13.33	21.67
Sub-Structures	3.00	100.00	0.00	0.00
Piers	3.00	86.67	13.33	0.00
Abutments	2.00	50.00	37.50	12.50
Drainage	3.00	30.00	15.00	55.00
Parapets / Rails	2.00	90.00	10.00	0.00
Super Structure	2.00	95.00	5.00	0.00
Water Way	3.00	100.00	0.00	0.00
Traffic Operations	km			
Signs / Reflectors	70.10	77.91	12.42	9.67
Guardrails / Barriers	70.10	76.95	10.96	12.09
Pavement Markings	70.10	75.73	14.87	9.40
Signals	50.40	100.00	0.00	0.00
Overhead Signs	9.30	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 2-Arecibo

Secondary Roads - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	65.20	87.65	9.67	2.68
Pavement Structure	65.20	91.70	6.76	1.54
Shoulders / Curbs	65.20	90.13	8.46	1.41
Ditches / Drains	65.20	80.90	13.72	5.38
Slopes	47.00	98.24	0.00	1.76
Vegetation Control	65.20	79.77	13.82	6.41
Culverts	65.20	92.52	4.45	3.04
Bridges	Each			
Approaches	6.00	91.67	7.50	0.83
Deck	6.00	87.50	8.33	4.17
Deck Joints	6.00	60.00	20.83	19.17
Sub-Structures	6.00	100.00	0.00	0.00
Piers	5.00	99.00	1.00	0.00
Abutments	6.00	80.00	1.67	18.33
Drainage	6.00	78.33	8.33	13.33
Parapets / Rails	6.00	98.33	0.00	1.67
Super Structure	2.00	100.00	0.00	0.00
Water Way	5.00	100.00	0.00	0.00
Traffic Operations	km			
Signs / Reflectors	65.20	83.69	10.07	6.24
Guardrails / Barriers	65.20	86.04	6.07	7.90
Pavement Markings	65.20	87.20	7.87	4.93
Signals	26.80	98.77	1.23	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 2-Arecibo

Tertiary Roads - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	32.20	85.11	11.99	3.04
Pavement Structure	32.20	90.95	6.37	2.69
Shoulders / Curbs	32.20	78.93	11.97	9.10
Ditches / Drains	32.20	79.57	9.49	10.95
Slopes	18.60	90.43	2.39	7.18
Vegetation Control	32.20	80.96	11.80	7.24
Culverts	32.20	92.14	4.04	3.82
Bridges	Each			
Approaches	4.00	97.50	2.50	0.00
Deck	4.00	95.00	5.00	0.00
Deck Joints	4.00	47.50	17.50	35.00
Sub-Structures	4.00	100.00	0.00	0.00
Piers	3.00	96.67	3.33	0.00
Abutments	4.00	93.75	0.00	6.25
Drainage	4.00	45.00	12.50	42.50
Parapets / Rails	4.00	95.00	5.00	0.00
Super Structure	3.00	93.33	6.67	0.00
Water Way	4.00	100.00	0.00	0.00
Traffic Operations	km			
Signs / Reflectors	32.20	87.03	9.50	3.46
Guardrails / Barriers	32.20	80.59	9.53	10.99
Pavement Markings	32.20	52.61	16.83	30.56
Signals	6.00	91.67	0.00	8.33

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 2-Arecibo

ALL ROADS - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	167.50	86.45	10.87	2.71
Pavement Structure	167.50	90.29	7.57	2.14
Shoulders / Curbs	167.50	87.73	7.95	4.33
Ditches / Drains	167.50	82.31	11.18	6.51
Slopes	117.60	95.10	1.61	3.29
Vegetation Control	167.50	84.65	10.52	4.83
Culverts	161.50	93.41	4.44	2.15
Bridges	Each			
Approaches	13.00	94.23	5.38	0.38
Deck	13.00	90.38	6.92	2.69
Deck Joints	13.00	57.31	18.08	24.62
Sub-Structures	13.00	100.00	0.00	0.00
Piers	11.00	95.00	5.00	0.00
Abutments	12.00	79.58	7.08	13.33
Drainage	13.00	56.92	11.15	31.92
Parapets / Rails	12.00	95.83	3.33	0.83
Super Structure	7.00	95.71	4.29	0.00
Water Way	12.00	100.00	0.00	0.00
Traffic Operations	km			
Signs / Reflectors	167.50	81.91	10.94	7.14
Guardrails / Barriers	167.50	81.19	8.78	10.25
Pavement Markings	167.50	75.75	12.52	11.73
Signals	83.20	99.00	0.40	0.60
Overhead Signs	9.30	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 3-Aguadilla

Primary Roads - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	51.30	87.87	8.81	3.32
Pavement Structure	51.30	97.48	2.52	0.00
Shoulders / Curbs	51.30	94.17	4.54	1.29
Ditches / Drains	51.30	90.97	6.19	2.84
Slopes	51.30	97.02	2.98	0.00
Vegetation Control	51.30	91.60	7.60	0.80
Culverts	51.30	92.12	4.51	3.37
Bridges	Each			
Approaches	1.00	90.00	5.00	5.00
Deck	1.00	90.00	10.00	0.00
Deck Joints	1.00	0.00	0.00	100.00
Sub-Structures	1.00	100.00	0.00	0.00
Piers	1.00	100.00	0.00	0.00
Abutments	1.00	100.00	0.00	0.00
Drainage	1.00	90.00	10.00	0.00
Parapets / Rails	1.00	90.00	10.00	0.00
Super Structure	1.00	100.00	0.00	0.00
Water Way	1.00	95.00	5.00	0.00
Traffic Operations	km			
Signs / Reflectors	51.30	90.58	8.62	0.80
Guardrails / Barriers	51.30	92.99	4.97	2.04
Pavement Markings	51.30	82.38	11.73	5.90
Signals	51.30	100.00	0.00	0.00
Overhead Signs	29.90	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 3-Aguadilla

Secondary Roads - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	63.20	81.24	13.97	4.79
Pavement Structure	63.20	88.29	10.13	1.58
Shoulders / Curbs	62.20	84.44	10.67	4.90
Ditches / Drains	63.20	84.97	10.55	4.48
Slopes	62.20	97.07	2.22	0.71
Vegetation Control	63.20	89.63	6.51	3.86
Culverts	63.20	98.42	1.58	0.00
Bridges	Each			
Approaches	2.00	92.50	7.50	0.00
Deck	2.00	95.00	5.00	0.00
Deck Joints	1.00	90.00	10.00	0.00
Sub-Structures	2.00	100.00	0.00	0.00
Piers	1.00	100.00	0.00	0.00
Abutments	2.00	100.00	0.00	0.00
Drainage	2.00	55.00	20.00	25.00
Parapets / Rails	2.00	100.00	0.00	0.00
Super Structure	1.00	100.00	0.00	0.00
Water Way	2.00	95.00	5.00	0.00
Traffic Operations	km			
Signs / Reflectors	63.20	86.91	7.37	5.73
Guardrails / Barriers	63.20	88.06	5.70	6.24
Pavement Markings	63.20	72.09	13.81	14.10
Signals	49.10	99.57	0.00	0.43

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 3-Aguadilla

Tertiary Roads - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	41.80	85.53	9.84	4.63
Pavement Structure	41.80	89.19	8.94	2.18
Shoulders / Curbs	41.80	88.39	7.18	4.44
Ditches / Drains	41.80	83.30	10.91	5.79
Slopes	40.30	98.85	0.50	0.66
Vegetation Control	41.80	86.10	10.43	3.47
Culverts	41.80	97.89	1.84	0.26
Bridges	Each			
Approaches	3.00	95.00	5.00	0.00
Deck	3.00	93.33	3.33	3.33
Deck Joints	3.00	33.33	0.00	66.67
Sub-Structures	3.00	100.00	0.00	0.00
Piers	3.00	100.00	0.00	0.00
Abutments	3.00	96.67	3.33	0.00
Drainage	3.00	36.67	13.33	50.00
Parapets / Rails	3.00	100.00	0.00	0.00
Super Structure	2.00	95.00	5.00	0.00
Water Way	3.00	100.00	0.00	0.00
Traffic Operations	km			
Signs / Reflectors	41.80	92.32	5.85	1.83
Guardrails / Barriers	41.80	88.03	6.39	5.59
Pavement Markings	41.80	76.56	13.83	9.62
Signals	3.10	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 3-Aguadilla

ALL ROADS - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	156.30	84.56	11.17	4.26
Pavement Structure	156.30	91.55	7.31	1.22
Shoulders / Curbs	156.30	88.72	7.70	3.58
Ditches / Drains	156.30	86.49	9.22	4.29
Slopes	153.80	97.52	2.02	0.46
Vegetation Control	156.30	89.33	7.92	2.75
Culverts	156.30	96.21	2.61	1.18
Bridges	Each			
Approaches	6.00	93.33	5.83	0.83
Deck	6.00	93.33	5.00	1.67
Deck Joints	5.00	38.00	2.00	60.00
Sub-Structures	6.00	100.00	0.00	0.00
Piers	5.00	100.00	0.00	0.00
Abutments	6.00	98.33	1.67	0.00
Drainage	6.00	51.67	15.00	33.33
Parapets / Rails	6.00	98.33	1.67	0.00
Super Structure	4.00	97.50	2.50	0.00
Water Way	6.00	97.50	2.50	0.00
Traffic Operations	km			
Signs / Reflectors	156.30	89.56	7.37	3.07
Guardrails / Barriers	156.30	89.67	5.64	4.69
Pavement Markings	156.30	76.66	13.13	10.21
Signals	103.50	99.80	0.00	0.20
Overhead Signs	29.90	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 4-Mayaquaz

Primary Roads - FY 2015

RATEDF ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	60.00	85.77	9.85	4.38
Pavement Structure	60.00	90.14	9.54	0.32
Shoulders / Curbs	60.00	92.92	7.08	0.00
Ditches / Drains	60.00	88.03	10.13	1.83
Slopes	40.20	98.56	0.00	1.44
Vegetation Control	60.00	91.05	6.75	2.20
Culverts	60.00	98.18	1.82	0.00
Bridges	Each			
Approaches	4.00	82.50	17.50	0.00
Deck	4.00	63.75	21.25	15.00
Deck Joints	4.00	50.00	38.75	11.25
Sub-Structures	4.00	100.00	0.00	0.00
Piers	4.00	100.00	0.00	0.00
Abutments	4.00	100.00	0.00	0.00
Drainage	4.00	27.50	36.25	36.25
Parapets / Rails	4.00	100.00	0.00	0.00
Water Way	4.00	100.00	0.00	0.00
Traffic Operations	km			
Signs / Reflectors	60.00	90.94	5.79	3.27
Guardrails / Barriers	60.00	89.70	6.57	3.73
Pavement Markings	60.00	89.84	3.93	6.23
Signals	36.20	100.00	0.00	0.00
Overhead Signs	5.10	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 4-Mayaquaz

Secondary Roads - FY 2015

RATED ITEM	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	48.54	88.44	7.81	3.75
Pavement Structure	48.54	92.39	3.86	3.75
Shoulders / Curbs	48.54	91.05	4.59	4.36
Ditches / Drains	48.54	86.23	12.86	0.91
Slopes	47.04	88.72	3.54	7.74
Vegetation Control	48.54	87.38	8.17	4.45
Culverts	48.54	98.42	1.58	0.00
Bridges	Each			
Approaches	3.00	96.67	3.33	0.00
Deck	3.00	86.67	10.00	3.33
Deck Joints	3.00	58.33	8.33	33.33
Sub-Structures	3.00	100.00	0.00	0.00
Piers	2.00	100.00	0.00	0.00
Abutments	3.00	100.00	0.00	0.00
Drainage	3.00	31.67	25.00	43.33
Parapets / Rails	3.00	100.00	0.00	0.00
Super Structure	1.00	100.00	0.00	0.00
Water Way	3.00	93.33	6.67	0.00
Traffic Operations	km			
Signs / Reflectors	48.54	88.59	8.75	2.66
Guardrails / Barriers	47.04	92.60	4.53	2.87
Pavement Markings	48.54	89.62	6.82	3.56
Signals	22.04	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 4-Mayaquaz

Tertiary Roads - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	26.30	91.14	6.94	1.92
Pavement Structure	26.30	95.59	3.84	0.57
Shoulders / Curbs	26.30	81.33	12.03	6.63
Ditches / Drains	26.30	78.57	13.14	8.29
Slopes	20.20	98.47	0.74	0.79
Vegetation Control	26.30	85.57	10.02	4.41
Culverts	26.30	92.68	7.32	0.00
Bridges	Each			
Approaches	5.00	95.00	5.00	0.00
Deck	5.00	90.00	8.00	2.00
Deck Joints	4.00	45.00	7.50	47.50
Sub-Structures	5.00	100.00	0.00	0.00
Piers	4.00	100.00	0.00	0.00
Abutments	5.00	100.00	0.00	0.00
Drainage	5.00	38.00	32.00	30.00
Parapets / Rails	5.00	100.00	0.00	0.00
Super Structure	2.00	95.00	5.00	0.00
Water Way	4.00	95.00	0.00	5.00
Traffic Operations	km			
Signs / Reflectors	26.30	91.14	5.38	3.48
Guardrails / Barriers	21.00	93.26	5.64	1.10
Pavement Markings	26.30	71.94	14.56	13.50
Signals	8.50	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 4-Mayaquaz

ALL ROADS - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	134.84	87.78	8.55	3.67
Pavement Structure	134.84	92.01	6.39	1.60
Shoulders / Curbs	134.84	89.98	7.15	2.86
Ditches / Drains	134.84	85.54	11.70	2.76
Slopes	107.44	94.23	1.69	4.08
Vegetation Control	134.84	88.66	7.90	3.44
Culverts	134.84	97.20	2.80	0.00
Bridges	Each			
Approaches	12.00	91.25	8.75	0.00
Deck	12.00	80.42	12.92	6.67
Deck Joints	11.00	50.45	19.09	30.45
Sub-Structures	12.00	100.00	0.00	0.00
Piers	10.00	100.00	0.00	0.00
Abutments	12.00	100.00	0.00	0.00
Drainage	12.00	32.92	31.67	35.42
Parapets / Rails	12.00	100.00	0.00	0.00
Super Structure	3.00	96.67	3.33	0.00
Water Way	11.00	96.36	1.82	1.82
Traffic Operations	km			
Signs / Reflectors	134.84	90.13	6.78	3.09
Guardrails / Barriers	128.04	91.35	5.67	2.98
Pavement Markings	134.84	86.27	7.04	6.69
Signals	66.74	100.00	0.00	0.00
Overhead Signs	5.10	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 5-Ponce

Primary Roads - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	50.50	81.21	9.95	8.84
Pavement Structure	50.50	92.38	6.70	0.92
Shoulders / Curbs	50.50	92.34	6.47	1.20
Ditches / Drains	50.50	87.64	8.66	3.69
Slopes	39.90	90.44	7.97	1.59
Vegetation Control	50.50	90.02	8.32	1.66
Culverts	50.50	97.48	1.76	0.76
Bridges	Each			
Approaches	8.00	95.63	3.75	0.63
Deck	8.00	86.25	8.13	5.63
Deck Joints	6.00	45.00	30.00	25.00
Sub-Structures	8.00	97.50	1.25	1.25
Piers	8.00	100.00	0.00	0.00
Abutments	8.00	94.38	3.75	1.88
Drainage	8.00	54.38	17.50	28.13
Parapets / Rails	8.00	98.75	1.25	0.00
Super Structure	5.00	96.00	4.00	0.00
Painting	1.00	100.00	0.00	0.00
Water Way	7.00	98.57	1.43	0.00
Traffic Operations	km			
Signs / Reflectors	50.50	90.13	6.17	3.70
Guardrails / Barriers	48.80	87.46	5.33	5.25
Pavement Markings	50.50	85.20	8.32	6.48
Signals	10.20	96.67	0.83	2.50
Overhead Signs	8.50	99.00	1.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 5-Ponce

Secondary Roads - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	20.60	88.28	9.49	2.23
Pavement Structure	20.60	92.69	5.07	2.23
Shoulders / Curbs	20.60	87.57	9.00	3.42
Ditches / Drains	20.60	65.19	17.96	16.84
Slopes	18.40	84.84	10.11	5.05
Vegetation Control	20.60	78.16	12.23	9.61
Culverts	20.60	90.97	0.00	9.03
Bridges	Each			
Approaches	4.00	96.25	3.75	0.00
Deck	4.00	96.25	3.75	0.00
Deck Joints	4.00	56.25	18.75	25.00
Sub-Structures	4.00	100.00	0.00	0.00
Piers	4.00	95.00	2.50	2.50
Abutments	4.00	93.75	0.00	6.25
Drainage	4.00	68.75	6.25	25.00
Parapets / Rails	4.00	98.75	0.00	1.25
Super Structure	1.00	100.00	0.00	0.00
Painting	1.00	100.00	0.00	0.00
Water Way	4.00	92.50	2.50	7.50
Traffic Operations	km			
Signs / Reflectors	20.60	89.37	8.37	2.26
Guardrails / Barriers	20.60	74.61	5.68	19.71
Pavement Markings	20.60	90.61	5.53	3.86
Signals	11.30	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 5-Ponce

Tertiary Roads - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	29.20	84.08	11.15	4.78
Pavement Structure	29.20	88.90	8.66	2.43
Shoulders / Curbs	29.20	88.25	9.98	1.76
Ditches / Drains	29.20	77.47	15.82	6.71
Slopes	20.90	96.75	3.25	0.00
Vegetation Control	29.20	86.27	12.02	1.71
Culverts	29.20	96.47	2.67	0.86
Bridges	Each			
Approaches	3.00	83.33	5.00	11.67
Deck	3.00	81.67	11.67	6.67
Deck Joints	3.00	56.67	30.00	13.33
Sub-Structures	3.00	100.00	0.00	0.00
Piers	3.00	96.67	3.33	0.00
Abutments	3.00	80.00	20.00	0.00
Drainage	3.00	66.67	20.00	13.33
Parapets / Rails	3.00	100.00	0.00	0.00
Super Structure	1.00	100.00	0.00	0.00
Painting	1.00	100.00	0.00	0.00
Water Way	3.00	100.00	0.00	0.00
Traffic Operations	km			
Signs / Reflectors	29.20	88.10	7.52	4.38
Guardrails / Barriers	29.20	87.05	7.60	5.34
Pavement Markings	29.20	82.16	11.92	5.92
Signals	3.50	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 5-Ponce

Expressways (Toll Roads) - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	74.20	81.77	12.65	5.59
Pavement Structure	74.20	87.85	10.21	1.94
Shoulders / Curbs	74.20	92.62	5.42	1.95
Ditches / Drains	74.20	97.51	1.97	0.53
Slopes	58.00	98.74	1.26	0.00
Vegetation Control	74.20	95.77	3.10	1.13
Culverts	74.20	100.00	0.00	0.00
Bridges	Each			
Approaches	6.00	98.33	1.67	0.00
Deck	6.00	73.33	13.33	13.33
Deck Joints	6.00	60.83	3.33	35.83
Sub-Structures	6.00	100.00	0.00	0.00
Piers	6.00	100.00	0.00	0.00
Abutments	6.00	100.00	0.00	0.00
Drainage	6.00	85.83	10.00	4.17
Parapets / Rails	6.00	100.00	0.00	0.00
Water Way	6.00	100.00	0.00	0.00
Traffic Operations	km			
Signs / Reflectors	74.20	93.58	4.45	1.97
Guardrails / Barriers	74.20	87.76	7.38	4.87
Pavement Markings	74.20	82.74	8.48	8.78
Overhead Signs	74.20	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 5-Ponce

ALL ROADS - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	174.50	82.76	11.24	6.00
Pavement Structure	174.50	89.91	8.33	1.76
Shoulders / Curbs	174.50	91.21	6.91	1.88
Ditches / Drains	174.50	87.48	8.11	4.40
Slopes	137.20	94.16	4.70	1.14
Vegetation Control	174.50	90.44	7.18	2.38
Culverts	174.50	97.61	0.96	1.43
Bridges	Each			
Approaches	21.00	94.76	3.33	1.90
Deck	21.00	83.81	9.29	6.90
Deck Joints	19.00	54.21	19.21	26.58
Sub-Structures	21.00	99.05	0.48	0.48
Piers	21.00	98.57	0.95	0.48
Abutments	21.00	93.81	4.29	1.90
Drainage	21.00	67.86	13.57	18.57
Parapets / Rails	21.00	99.29	0.48	0.24
Super Structure	7.00	97.14	2.86	0.00
Painting	3.00	100.00	0.00	0.00
Water Way	20.00	98.00	1.00	1.50
Traffic Operations	km			
Signs / Reflectors	174.50	91.17	5.93	2.91
Guardrails / Barriers	172.80	85.99	6.63	6.82
Pavement Markings	172.80	84.27	8.67	7.06
Signals	25.00	98.64	0.34	1.02
Overhead Signs	82.70	99.90	0.10	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 6-Guayama

Primary Roads - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	12.70	95.00	5.00	0.00
Pavement Structure	12.70	96.46	3.54	0.00
Shoulders / Curbs	12.70	97.64	2.36	0.00
Ditches / Drains	12.70	77.36	13.39	9.25
Slopes	3.30	100.00	0.00	0.00
Vegetation Control	12.70	91.69	8.31	0.00
Culverts	12.70	100.00	0.00	0.00
Bridges	Each			
Approaches	2.00	97.50	2.50	0.00
Deck	2.00	100.00	0.00	0.00
Deck Joints	2.00	25.00	30.00	45.00
Sub-Structures	2.00	100.00	0.00	0.00
Piers	2.00	100.00	0.00	0.00
Abutments	2.00	100.00	0.00	0.00
Drainage	2.00	50.00	30.00	20.00
Parapets / Rails	2.00	100.00	0.00	0.00
Water Way	2.00	100.00	0.00	0.00
Traffic Operations	km			
Signs / Reflectors	12.70	91.97	5.51	2.52
Guardrails / Barriers	12.70	95.55	2.09	2.36
Pavement Markings	12.70	85.39	5.16	7.09
Signals	12.70	95.28	0.00	4.72

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 6-Guayama

Secondary Roads - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	11.30	86.02	7.88	6.11
Pavement Structure	11.30	87.79	9.16	3.05
Shoulders / Curbs	11.30	83.89	6.95	9.16
Ditches / Drains	11.30	81.42	8.23	10.35
Slopes	9.30	85.16	7.42	7.42
Vegetation Control	11.30	78.50	9.29	12.21
Culverts	11.30	87.79	6.11	6.11
Bridges	Each			
Approaches	2.00	97.50	2.50	0.00
Deck	2.00	95.00	5.00	0.00
Deck Joints	2.00	50.00	0.00	50.00
Sub-Structures	2.00	100.00	0.00	0.00
Piers	2.00	100.00	0.00	0.00
Abutments	2.00	65.00	5.00	30.00
Drainage	2.00	0.00	0.00	100.00
Parapets / Rails	2.00	100.00	0.00	0.00
Water Way	2.00	100.00	0.00	0.00
Traffic Operations	km			
Signs / Reflectors	11.30	88.01	7.88	4.12
Guardrails / Barriers	11.30	80.80	19.20	0.00
Pavement Markings	11.30	80.80	13.10	6.11
Signals	2.00	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 6-Guayama

Tertiary Roads - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	47.20	88.29	8.94	2.76
Pavement Structure	47.20	93.16	6.47	0.37
Shoulders / Curbs	47.20	88.14	8.69	3.18
Ditches / Drains	47.20	78.13	15.22	6.65
Slopes	42.30	98.10	1.90	0.00
Vegetation Control	47.20	84.75	11.65	3.60
Culverts	47.20	93.85	3.95	2.20
Bridges	Each			
Approaches	7.00	95.00	5.00	0.00
Deck	7.00	90.00	10.00	0.00
Deck Joints	6.00	30.00	26.67	43.33
Sub-Structures	7.00	100.00	0.00	0.00
Piers	6.00	100.00	0.00	0.00
Abutments	7.00	85.71	9.29	5.00
Drainage	7.00	44.29	18.57	37.14
Parapets / Rails	7.00	98.57	1.43	0.00
Super Structure	4.00	97.50	2.50	0.00
Water Way	7.00	99.29	0.71	0.00
Traffic Operations	km			
Signs / Reflectors	47.20	90.15	6.39	3.46
Guardrails / Barriers	47.20	85.42	8.20	6.38
Pavement Markings	47.20	76.59	13.54	9.87
Signals	8.80	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 6-Guayama

Expressways (Toll Roads) - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	107.40	88.27	9.64	2.09
Pavement Structure	107.40	92.20	7.80	0.00
Shoulders / Curbs	107.40	92.01	7.49	0.50
Ditches / Drains	107.40	98.39	0.71	0.90
Slopes	107.40	97.93	1.16	0.90
Vegetation Control	107.40	99.29	0.71	0.00
Culverts	107.40	99.19	0.81	0.00
Bridges	Each			
Approaches	8.00	98.75	1.25	0.00
Deck	8.00	93.75	3.75	2.50
Deck Joints	8.00	81.25	3.75	15.00
Sub-Structures	8.00	100.00	0.00	0.00
Piers	8.00	100.00	0.00	0.00
Abutments	8.00	96.88	3.13	0.00
Drainage	8.00	60.00	18.75	21.25
Parapets / Rails	8.00	99.38	0.63	0.00
Super Structure	2.00	100.00	0.00	0.00
Water Way	6.00	100.00	0.00	0.00
Traffic Operations	km			
Signs / Reflectors	107.40	92.31	6.93	0.76
Guardrails / Barriers	107.40	81.35	9.87	8.78
Pavement Markings	107.40	85.41	9.11	5.49
Overhead Signs	107.40	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 6-Guayama

ALL ROADS - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	178.60	88.61	9.01	2.38
Pavement Structure	178.60	92.48	7.23	0.29
Shoulders / Curbs	178.60	90.87	7.41	1.72
Ditches / Drains	178.60	90.46	5.92	3.61
Slopes	162.30	97.29	1.69	1.02
Vegetation Control	178.60	93.59	4.68	1.72
Culverts	178.60	97.11	1.92	0.97
Bridges	Each			
Approaches	19.00	97.11	2.89	0.00
Deck	19.00	93.16	5.79	1.05
Deck Joints	18.00	54.44	13.89	31.67
Sub-Structures	19.00	100.00	0.00	0.00
Piers	18.00	100.00	0.00	0.00
Abutments	19.00	89.74	5.26	5.00
Drainage	19.00	46.84	17.89	35.26
Parapets / Rails	19.00	99.21	0.79	0.00
Super Structure	19.00	98.33	1.67	0.00
Water Way	17.00	99.71	0.29	0.00
Signs / Reflectors	178.60	91.44	6.74	1.81
Guardrails / Barriers	178.60	83.40	9.47	7.14
Pavement Markings	178.60	82.78	10.25	6.80
Signals	23.50	97.45	0.00	2.55
Overhead Signs	107.40	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 7-Humacao

Primary Roads - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	87.00	86.85	8.22	4.93
Pavement Structure	87.00	90.33	7.48	2.19
Shoulders / Curbs	87.00	84.92	9.06	6.02
Ditches / Drains	87.00	79.48	15.49	5.02
Slopes	75.60	96.96	1.22	1.83
Vegetation Control	87.00	86.30	10.56	3.14
Culverts	87.00	94.97	2.49	2.53
Bridges	Each			
Approaches	10.00	94.50	2.50	3.00
Deck	10.00	81.00	13.00	6.00
Deck Joints	10.00	40.00	25.00	35.00
Sub-Structures	10.00	100.00	0.00	0.00
Piers	8.00	96.25	3.75	0.00
Abutments	10.00	97.00	3.00	0.00
Drainage	10.00	56.50	15.00	28.50
Parapets / Rails	10.00	87.00	1.00	12.00
Super Structure	3.00	100.00	0.00	0.00
Water Way	9.00	100.00	0.00	0.00
Traffic Operations	km			
Signs / Reflectors	87.00	86.89	8.99	4.13
Guardrails / Barriers	87.00	88.05	6.55	5.40
Pavement Markings	87.00	83.82	10.67	5.51
Signals	54.10	100.00	0.00	0.00
Overhead Signs	23.30	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 7-Humacao

Secondary Roads - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	35.90	87.86	8.38	3.76
Pavement Structure	35.90	88.52	8.64	2.84
Shoulders / Curbs	35.90	84.99	10.17	4.85
Ditches / Drains	35.90	60.00	22.01	17.99
Slopes	20.30	96.06	1.97	1.97
Vegetation Control	35.90	84.28	10.06	5.67
Culverts	35.90	89.42	6.13	4.46
Bridges	Each			
Approaches	4.00	95.00	5.00	0.00
Deck	4.00	95.00	2.50	2.50
Deck Joints	4.00	35.00	12.50	52.50
Sub-Structures	4.00	100.00	0.00	0.00
Piers	4.00	100.00	0.00	0.00
Abutments	4.00	97.50	2.50	0.00
Drainage	3.00	56.67	6.67	36.67
Parapets / Rails	4.00	95.00	2.50	2.50
Super Structure	3.00	100.00	0.00	0.00
Water Way	4.00	100.00	0.00	0.00
Traffic Operations	km			
Signs / Reflectors	35.90	86.03	10.65	3.31
Guardrails / Barriers	35.90	84.01	6.42	9.57
Pavement Markings	35.90	75.40	13.52	11.07
Signals	15.50	100.00	0.00	0.00
Overhead Signs	5.90	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 7-Humacao

Tertiary Roads - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	57.30	77.00	13.73	9.28
Pavement Structure	57.30	83.99	9.82	6.20
Shoulders / Curbs	57.30	77.02	14.21	8.76
Ditches / Drains	57.30	46.61	24.94	28.45
Slopes	46.00	85.37	4.00	10.63
Vegetation Control	57.30	67.84	17.81	14.35
Culverts	57.30	90.00	5.18	4.82
Bridges	Each			
Approaches	8.00	97.50	1.25	1.25
Deck	7.00	92.14	5.71	2.14
Deck Joints	7.00	57.14	12.14	30.71
Sub-Structures	7.00	100.00	0.00	0.00
Piers	6.00	88.33	10.00	1.67
Abutments	7.00	100.00	0.00	0.00
Drainage	7.00	59.29	13.57	27.14
Parapets / Rails	7.00	97.14	1.43	1.43
Super Structure	5.00	98.00	2.00	0.00
Painting	2.00	50.00	50.00	0.00
Water Way	7.00	92.86	7.14	0.00
Traffic Operations	km			
Signs / Reflectors	57.30	77.75	12.20	10.05
Guardrails / Barriers	57.30	84.23	8.59	7.18
Pavement Markings	57.30	53.33	13.08	33.59
Signals	11.00	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 7-Humacao

Expressways (Toll Roads) - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	151.40	90.86	6.99	2.15
Pavement Structure	151.40	95.25	3.89	0.86
Shoulders / Curbs	151.40	93.18	4.28	2.54
Ditches / Drains	151.40	95.32	3.40	1.28
Slopes	151.40	96.92	2.40	0.69
Vegetation Control	151.40	93.82	6.18	0.00
Culverts	151.40	99.74	0.26	0.00
Bridges	Each			
Approaches	13.00	87.31	8.85	3.85
Deck	13.00	95.77	4.23	0.00
Deck Joints	13.00	46.92	16.92	36.15
Sub-Structures	13.00	99.23	0.77	0.00
Piers	11.00	100.00	0.00	0.00
Abutments	13.00	98.85	1.15	0.00
Drainage	13.00	72.31	10.77	16.92
Parapets / Rails	13.00	98.85	1.15	0.00
Super Structure	4.00	100.00	0.00	0.00
Water Way	11.00	100.00	0.00	0.00
Traffic Operations	km			
Signs / Reflectors	151.40	90.97	6.73	2.31
Guardrails / Barriers	151.40	88.07	8.49	3.44
Pavement Markings	151.40	92.50	5.81	1.69
Signals	12.50	100.00	0.00	0.00
Overhead Signs	151.40	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Region 7-Humacao

ALL ROADS - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	331.60	87.09	8.63	4.28
Pavement Structure	331.60	91.29	6.37	2.34
Shoulders / Curbs	331.60	87.34	7.89	4.78
Ditches / Drains	331.60	78.92	12.31	8.77
Slopes	293.30	95.06	2.32	2.63
Vegetation Control	331.60	86.33	9.76	3.92
Culverts	331.60	95.69	2.33	1.98
Bridges	Each			
Approaches	35.00	92.57	4.86	2.57
Deck	34.00	90.59	6.91	2.50
Deck Joints	34.00	45.59	17.79	36.62
Sub-Structures	34.00	99.71	0.29	0.00
Piers	29.00	96.55	3.10	0.34
Abutments	34.00	98.38	1.62	0.00
Drainage	33.00	63.33	12.27	24.39
Parapets / Rails	34.00	94.56	1.32	4.12
Super Structure	15.00	99.33	0.67	0.00
Painting	2.00	50.00	50.00	0.00
Water Way	31.00	98.39	1.61	0.00
Traffic Operations	km			
Signs / Reflectors	331.60	87.08	8.69	4.23
Guardrails / Barriers	331.60	86.96	7.77	5.27
Pavement Markings	331.60	81.61	9.18	9.22
Signals	93.10	100.00	0.00	0.00
Overhead Signs	180.60	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Primary Roads - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	389.50	86.30	9.24	4.46
Pavement Structure	389.50	91.61	7.03	1.36
Shoulders / Curbs	389.50	90.57	6.64	2.79
Ditches / Drains	389.50	85.27	10.53	4.20
Slopes	266.60	95.63	2.72	1.65
Vegetation Control	389.50	90.27	7.74	1.99
Culverts	371.00	95.12	3.33	1.55
Bridges	Each			
Approaches	31.00	93.55	5.16	1.29
Deck	31.00	82.10	11.61	6.29
Deck Joints	29.00	40.17	27.07	32.76
Sub-Structures	31.00	97.74	0.32	1.94
Piers	29.00	96.90	3.10	0.00
Abutments	31.00	94.17	4.50	1.33
Drainage	31.00	50.16	20.32	29.52
Parapets / Rails	31.00	93.67	2.00	4.33
Super Structure	13.00	97.69	2.31	0.00
Painting	2.00	100.00	0.00	0.00
Water Way	27.00	99.44	0.56	0.00
Traffic Operations	km			
Signs / Reflectors	389.50	87.36	8.39	4.31
Guardrails / Barriers	387.80	86.42	7.53	5.80
Pavement Markings	389.50	83.25	9.86	6.81
Signals	264.10	99.52	0.10	0.38
Overhead Signs	104.50	99.92	0.08	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Secondary Roads - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	295.14	86.91	9.60	3.49
Pavement Structure	295.14	90.85	7.13	2.02
Shoulders / Curbs	294.14	89.25	7.50	3.25
Ditches / Drains	295.14	79.48	13.12	7.41
Slopes	233.94	94.35	2.69	2.96
Vegetation Control	295.14	85.72	9.22	5.05
Culverts	295.14	94.31	3.10	2.59
Bridges	Each			
Approaches	27.00	94.63	4.81	0.56
Deck	27.00	92.04	6.11	1.85
Deck Joints	25.00	54.40	16.00	29.60
Sub-Structures	27.00	99.81	0.00	0.19
Piers	24.00	98.13	0.63	1.25
Abutments	27.00	91.11	1.67	7.22
Drainage	26.00	58.08	12.50	29.42
Parapets / Rails	27.00	97.78	0.74	1.48
Super Structure	11.00	100.00	0.00	0.00
Painting	2.00	100.00	0.00	0.00
Water Way	25.00	97.60	1.60	1.20
Traffic Operations	km			
Signs / Reflectors	295.14	87.18	8.61	4.21
Guardrails / Barriers	291.04	86.17	6.63	7.20
Pavement Markings	295.14	81.65	10.39	7.96
Signals	170.14	99.58	0.30	0.12
Overhead Signs	15.30	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Tertiary Roads - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	243.00	84.78	10.53	4.71
Pavement Structure	243.00	89.84	7.59	2.62
Shoulders / Curbs	243.00	83.50	10.91	5.58
Ditches / Drains	243.00	72.00	15.43	12.56
Slopes	195.00	94.13	2.46	3.41
Vegetation Control	243.00	81.05	12.63	6.32
Culverts	243.00	93.55	4.23	2.22
Bridges	Each			
Approaches	34.00	93.53	4.41	2.06
Deck	33.00	90.91	7.27	1.82
Deck Joints	31.00	46.77	17.90	35.32
Sub-Structures	33.00	100.00	0.00	0.00
Piers	25.00	96.40	3.20	0.40
Abutments	33.00	93.79	4.39	1.82
Drainage	33.00	48.64	18.64	32.73
Parapets / Rails	33.00	98.33	1.36	0.30
Super Structure	19.00	96.32	3.68	0.00
Painting	3.00	66.67	33.33	0.00
Water Way	32.00	96.88	2.34	0.78
Traffic Operations	km			
Signs / Reflectors	243.00	87.04	8.05	4.91
Guardrails / Barriers	237.70	85.96	7.83	6.36
Pavement Markings	243.00	68.21	13.66	18.14
Signals	49.90	99.00	0.00	1.00

SUMMARY OF MAINTENANCE CONDITION RATINGS

Expressways (Toll Roads) - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	383.40	88.26	8.74	3.00
Pavement Structure	387.40	92.77	6.53	0.71
Shoulders / Curbs	387.40	92.89	5.60	1.50
Ditches / Drains	387.40	96.60	2.51	0.89
Slopes	351.00	97.28	2.01	0.71
Vegetation Control	387.40	96.04	3.66	0.30
Culverts	387.40	99.33	0.63	0.04
Bridges	Each			
Approaches	31.00	91.61	5.81	2.58
Deck	31.00	90.81	5.81	3.39
Deck Joints	31.00	58.06	9.19	32.74
Sub-Structures	31.00	99.68	0.32	0.00
Piers	27.00	100.00	0.00	0.00
Abutments	31.00	97.58	1.94	0.48
Drainage	31.00	74.19	12.10	13.71
Parapets / Rails	31.00	99.35	0.65	0.00
Super Structure	9.00	100.00	0.00	0.00
Painting	1.00	100.00	0.00	0.00
Water Way	25.00	100.00	0.00	0.00
Traffic Operations	km			
Signs / Reflectors	387.40	91.90	6.33	1.77
Guardrails / Barriers	387.40	86.21	8.50	5.30
Pavement Markings	387.40	87.65	7.55	4.80
Signals	16.50	100.00	0.00	0.00
Overhead Signs	381.60	100.00	0.00	0.00

SUMMARY OF MAINTENANCE CONDITION RATINGS
ALL ROADS - FY 2015

RATED ITEMS	Sample Size	Good	Fair	Poor
Roadway	km			
Pavement Surface	1315.04	86.73	9.41	3.86
Pavement Structure	1315.04	91.46	7.01	1.55
Shoulders / Curbs	1314.04	89.65	7.32	3.03
Ditches / Drains	1315.04	84.86	9.65	5.49
Slopes	1046.54	95.62	2.43	1.96
Vegetation Control	1315.04	89.25	7.77	2.98
Culverts	1296.54	95.90	2.64	1.46
Bridges	Each			
Approaches	122.00	93.29	5.04	1.67
Deck	122.00	88.89	7.75	3.36
Deck Joints	116.00	49.78	17.46	32.76
Sub-Structures	122.00	99.30	0.16	0.53
Piers	111.00	97.86	1.76	0.38
Abutments	122.00	94.26	3.18	2.56
Drainage	122.00	57.60	16.07	26.32
Parapets / Rails	122.00	97.31	1.20	1.49
Super Structure	52.00	98.08	1.92	0.00
Painting	8.00	87.50	12.50	0.00
Water Way	109.00	98.39	1.19	0.50
Traffic Operations	km			
Signs / Reflectors	1315.04	88.60	7.77	3.65
Guardrails / Barriers	1303.94	86.22	7.67	6.07
Pavement Markings	1315.04	81.41	10.00	8.57
Signals	500.64	99.50	0.16	0.34
Overhead Signs	501.40	99.98	0.02	0.00